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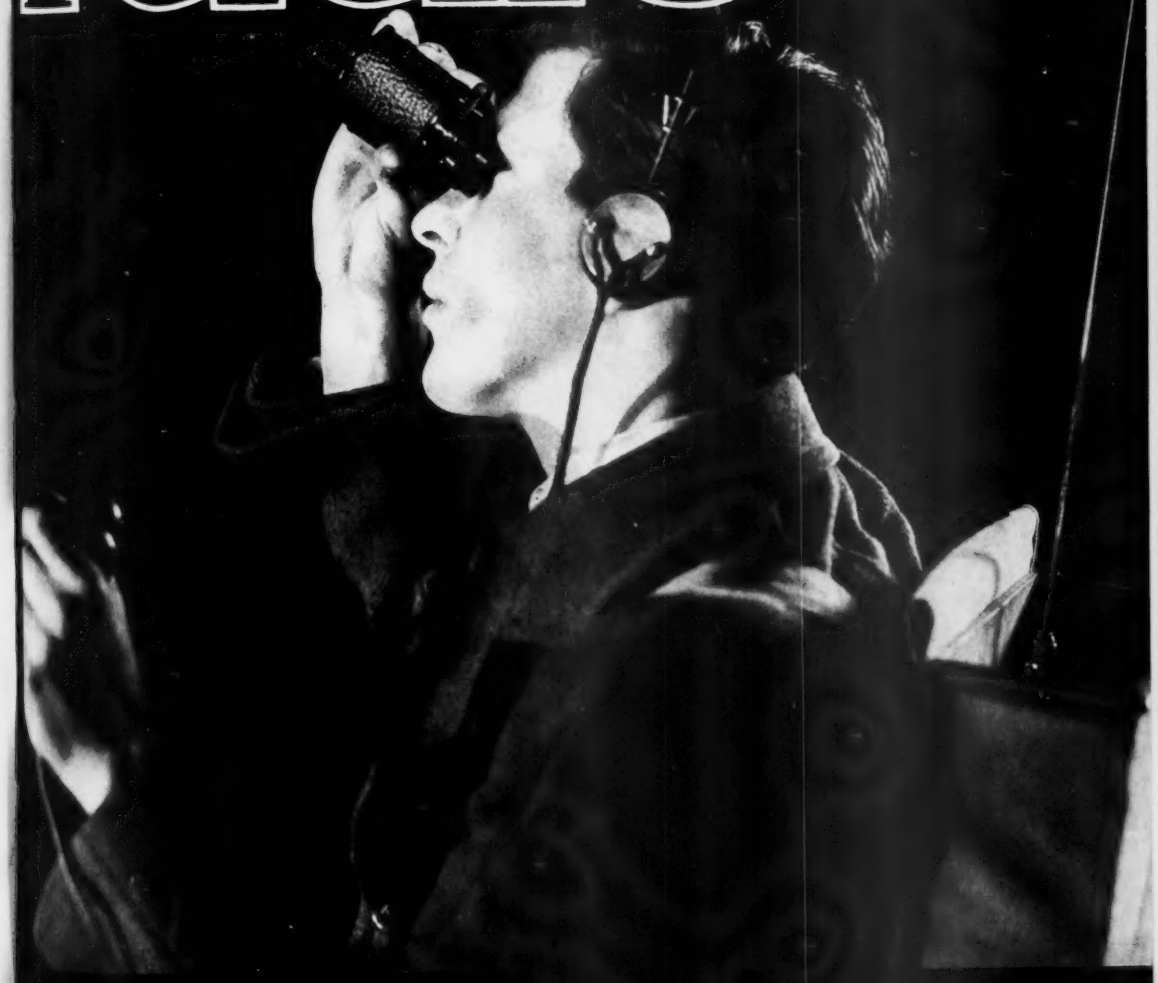

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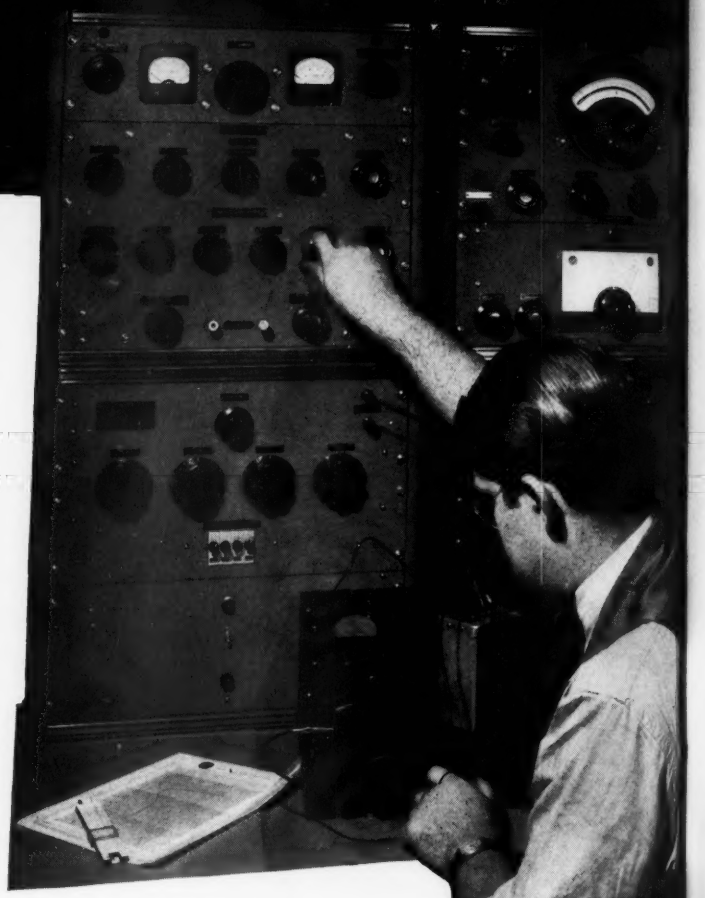

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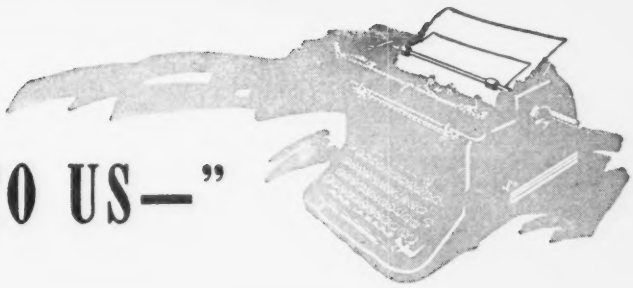


"IT SEEMS TO US—"

GADGETEERS NEEDED

IN MANY ways this is a war of radio gadgets. Radio is used not only for communication but for a growing number of other applications of the greatest potential importance. You have heard of radio locating but there are others about which scarcely a word is breathed, developments whose bold imagery would make your hair curl if you could hear of them.

The radio amateur adapts himself naturally to these applications of radio to extraordinary gadgetry. They differ only in magnitude from the marvels that the ham has brought forth these many years from the inexhaustible resources of his "junk box." That is why amateurs are being so eagerly sought for wartime tasks in development laboratories and for service with the forces; they are naturals for this kind of work.

The number of people needed to carry on these various kinds of radio work is simply prodigious. We used to hear of fifty specialists needed for this kind of project, a hundred for that. Now the figures go up ten thousand at a crack. We have concluded that it is not possible to overestimate the number of radiomen needed in this war. Now then, you fellows: You are the possessors of valuable particularized knowledge acquired in your years of amateur work. You know more about radio than can be learned by the students of quickie training schools and you know it better because you've loved it. You have an instinctive feel that can't be theirs without years of experience. You're needed, because there is a bad shortage of trained radio people. If you're able-bodied and can be spared from home, you ought to be somewhere in the wartime radio picture, doing something in radio's vital contribution to the national effort. For your consideration we present in *QST* each month the latest appeals for your services. If you need personal advice, write to ARRL President Bailey, outlining your qualifications. The U. S. is calling, and we should remember that U. S. means Us.

By the way, have you any ability to imagine what amateur radio is going to be like after this war? We've tried but the load on our rectifiers is too great. The number of new people to receive radio training in this country is certainly not to be estimated at less than a quarter million and more likely it will be half a million. That's greater than the number of all the people who've ever been amateurs in America. An awful lot of the war-trained men will want to become amateurs, to follow up the interest they generated while in the service. And the new developments in apparatus and technique! Boy-oh-boy, it's going to be something when the wraps can be taken off the wartime gear! It will be a new kind of amateur radio, with some possibilities that would rather strain your belief to-day. And out in front in that new amateur radio are going to be the lads who are seeing service now in radio's amazing wartime developments in gadgets.

PROGRESS

THE action of FCC in resuming the issuing of operator licenses to new amateur applicants will be applauded everywhere, not only because it's the first relaxation of wartime stoppages but because of the good it will accomplish. Fifteen hundred waiting applicants who passed the examination will now be awarded their tickets and thousands of would-be applicants will now be encouraged to finish their study and apply. The country needs these operators. Both Army and Navy recognize the holding of an FCC amateur license as attesting useful proficiency, and the resumption will be helpful to them. Innumerable radio training classes will use the amateur examination as the proof of accomplishment. And so many of our fellows are away from home in the services that, in our opinion, we're going to need all the additional operators we can get to man the amateur part of the ARP communications system. It's an all-around good action.

Speaking of ARP, we had expected to be able to give you in this issue the details of a new plan to make use of the talents and apparatus of hams in civilian-defense communications. Unfortunately the job of preparing and approving the plan has made slow progress through OCD, so that just now, when we have to go to press, it is poised for the consideration of the DCB. It is never safe to count tubes un-

til they are in the sockets and the filaments lighted, and even then they may be gassy. But we are told that DCB continues to wait in receptive mood for an OCD plan, and that this is a good one with strict controls for security and operations, carefully considered. The need is great to establish at once the arrangements for amateur participation. It may be hoped that we'll have favorable word before this ink is dry. If it comes, ARRL will rush the news around the country — to the directors, the SCMs and ECs, the clubs. Time is short, so keep yourself in touch with one of them, that you may hear what is happening. In fact it won't hurt to watch W1AW's frequencies too, since the possibility exists that our headquarters station will be restored to the air to resume its very useful work.

WOMEN AUXILIARIES

IT IS our belief that, whether or not they as yet recognize their need, the Army and Navy will be forming women's auxiliary corps before another year is gone. We foresee a call to the YLs and OWs to enlist in the khaki and blue, much as has been done in England. They will be needed, we think, for the many tasks in which their substitution releases a man for fighting, and for the numerous jobs that they can do better than men.

We're probably ahead of our time in proposing this but it seems to us that the gals may profitably begin to think about it and start boning up. They will make admirable operators of radiotelegraph and radiotelephone stations in administrative communications, and of course they're born switchboard and teletype operators. In England the personnel of anti-aircraft range-finding sections is exclusively women, and most of the work of watching radiolocator instruments and 'phoning the resulting instructions is done by them. It seems to us that inevitably there will be a call in this country for tens of thousands of them for similar work.

The possession of FCC licenses shows that the YL and XYL operators have the necessary keenness and grasp of fundamentals which will be the chief requirements in this work. We can almost go on from there to outline the additional things that they could profitably study to prepare themselves. They ought to know typing and teletyping and the operation of a telephone switchboard. They should keep up their code speed. It would pay them to study hard on theory, particularly u.h.f. propagation and the functioning of cathode-ray tubes. Women have proved excellent in cryptanalysis and we believe that would be a valuable study too.

Already women who have some of these capabilities are being eagerly sought for Civil Service positions in various headquarters units of the military. The need will certainly grow more urgent. Those who prepare themselves will be able to make an important contribution to the job that confronts every American.

K. B. W.

Strays

If the prospective ham doesn't want to bother building a code practice outfit, he can tune the all-wave b.c. set to WWV on 5,000 kc. and place a key in the antenna circuit. WWV transmits a nice-sounding continuous signal 24 hours a day.

— *W. J. Bertram.*

—···—

A recent news dispatch, clipped by ex-W1BMS, tells us that the Belgians have trained African jungle natives as self-ciphering radio operators. The natives use the international Morse alphabet, but with such peculiar rhythm that white operators cannot understand the transmissions, although other native operators can make perfect copy.

We guess a couple must have strayed over into that AARS net we were listening to just before the blackout.

ATTENTION, WOMEN ONLY!

The Bureau of Ships of the Navy Department has vacancies for radio engineering aides and graduate physicists and engineers who are experienced radio amateurs. Salaries range from $1620 to $2000 per annum, higher for special qualifications. All positions are for duty in Washington, D. C., only. Address requests for applications to Bureau of Ships, Navy Department, Office of Civil Personnel, Washington, D. C.

OUR COVER

QUITE right — the photograph looks more like AWS than the ARP work W1JEQ's pack-set transmitter-receiver is advertised for on page 21. We just wanted to show that a unit of this type has many applications. Besides, it made a swell picture.

An All-Wave Converter

Filling In the Spectrum on Your Present Communications Receiver

BY DON H. MIX,* WITS

Many a ham is finding out these days that there are interesting goings-on between and around the amateur bands, too. Those with limited-coverage receivers will find that a wide-range converter like the one described here opens new vistas of operating interest.

A RECEIVER covering only the ham bands was a fine thing until December 7th last. Since then, it has somewhat resembled a ponderous mammal of ivory hue. While we can't transmit, we are still permitted the use of our receivers — and don't think there isn't plenty of interest to hear both between the ham bands and on the frequencies below. The answer to the question of how we can use our ham-band receivers to pick up these signals is, of course, an all-wave converter. Even though such a fine instrument as the NC101X is reduced to the lowly status of a receiver for the standard broadcast band, it is probably preferable to allowing it to gather dust and moisture on the shelf.

The design of the converter will depend largely upon the receiver with which it is to be used and upon the tuning and band-changing facilities desired. If the receiver is of the type covering the standard b.c. band as well as the higher frequencies between the ham bands, the converter need be built for the lower frequencies only. Those worth listening to may be covered readily in two bands between 550 and 70 kc. or so. If the receiver doesn't include the standard b.c. band, a third band may be added, while owners of strictly ham-band receivers will want to cover the whole range from 17 Mc. down to the lower frequencies.

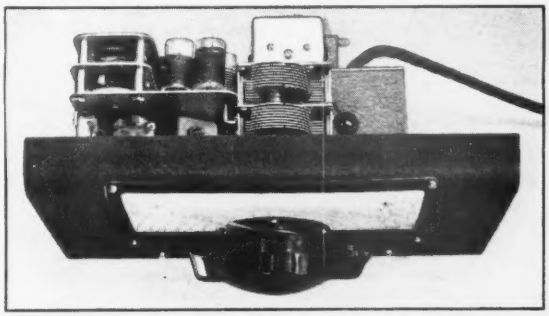
The converter may use plug-in coils and individually-controlled tuning condensers, but band-switching and single-control tuning can be incorporated without complicating the job unduly.

The converter shown in the accompanying photographs is designed to cover all frequencies between 17,000 and 67 kc. The circuit diagram, shown in Fig. 1, is really not as complicated as it looks, since there are only two simple tuned circuits — the mixer and oscillator grid circuits. The L_1 coils are in the antenna circuit. Each is coupled to an L_2 coil which may be switched across the mixer tuning condenser, C_1. In the oscillator circuit, the L_3 coils may be switched across C_2 to form a tuned circuit for the triode oscillator section of the 6K8.

The condensers with subscripts S are series trimmers which limit the maximum capacity across the coil for each tuning range, thereby providing an adjustment of the oscillator to the low-frequency end of each band. The parallel trimmers with subscript P set the minimum circuit capacity for adjusting the circuits to the high-frequency ends of the bands. The L_4 coils are tickler windings in the oscillator plate circuit.

An i.f. of 2000 kc. has been chosen, since it is a frequency to which all ham-band receivers will tune and one which is removed from frequencies on either side which may be in use by other services. Since the high-frequency oscillator subsequently operates at a frequency with a constant difference of 2000 kc. higher than the input signal frequency, the oscillator-frequency range to cover any band becomes rapidly narrower as the signal frequency decreases. For the signal range of 67 to 200 kc., the oscillator range need be only 2200 to 2067 kc. Therefore, it is possible to cover with a single coil, L_3-C, the oscillator-frequency range required for the signal-frequency range of 70 to 4500 kc. This will simplify considerably the switching system, especially when only the lower frequencies are to be covered.

The circuit diagram is laid out with the idea of making it easy to determine which coils and trimmer condensers may be dispensed with when



Front top view of the converter, showing the three higher-frequency mixer coils and the adjusting screw of the i.f. transformer trimmer. The panel has a curved top to fit a standard 7¼-inch by 10½-inch by 6-inch Parmetal cabinet type CA-100. If a straight panel is used, it should be at least 7¼ inches high by 10 inches long.

* Assistant Technical Editor, *QST*.

certain bands are not required. For instance, if the three higher-frequency bands are not required, the components with the subscripts *A*, *B* and *C* will be omitted. The only components to which this may not apply are the oscillator coils L_3-*C* and L_4-*C* which are used for the four lowest-frequency bands.

The plate circuit of the mixer is tuned to 2000

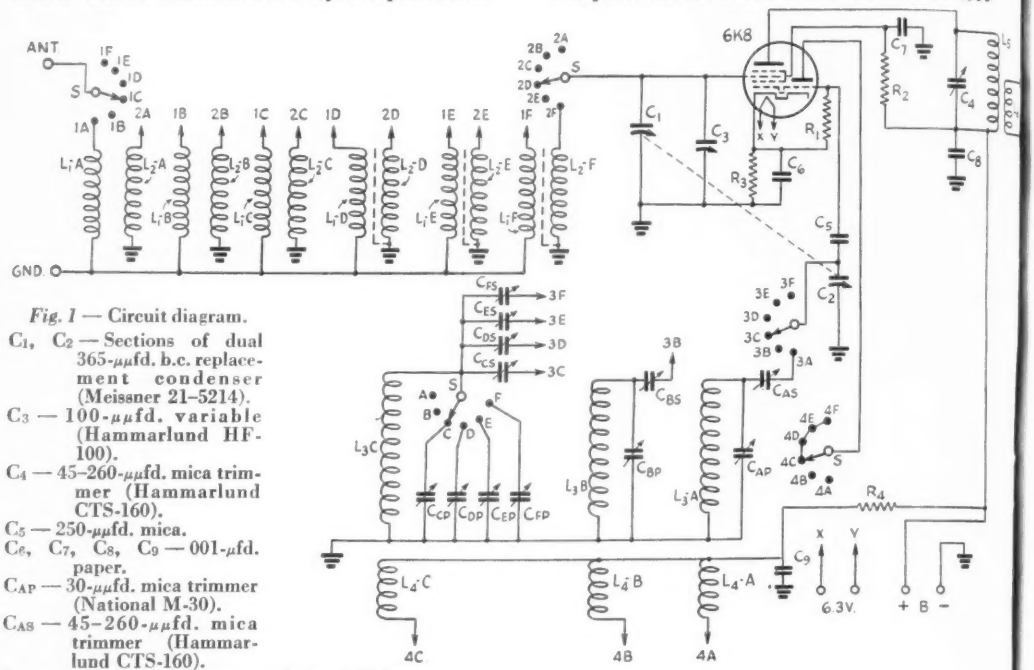
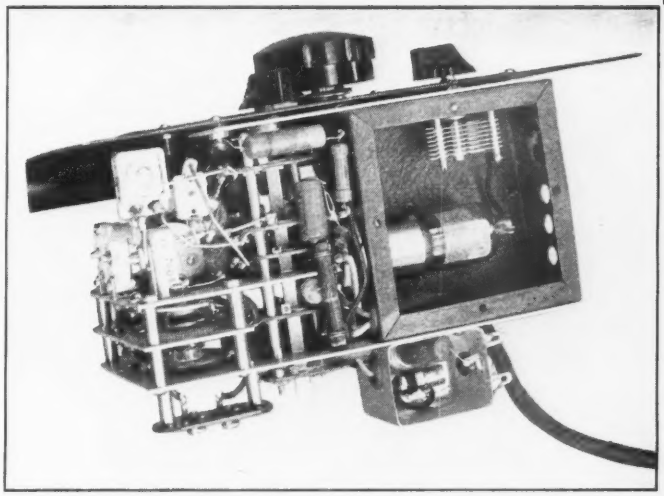


Fig. 1 — Circuit diagram.

C_1, C_2 — Sections of dual 365-$\mu\mu$fd. b.c. replacement condenser (Meissner 21–5214).
C_3 — 100-$\mu\mu$fd. variable (Hammarlund HF-100).
C_4 — 45–260-$\mu\mu$fd. mica trimmer (Hammarlund CTS-160).
C_5 — 250-$\mu\mu$fd. mica.
C_6, C_7, C_8, C_9 — 001-μfd. paper.
C_{AP} — 30-$\mu\mu$fd. mica trimmer (National M-30).
C_{AS} — 45–260-$\mu\mu$fd. mica trimmer (Hammarlund CTS-160).
C_{BP} — 30-$\mu\mu$fd. mica trimmer (National M-30).
C_{BS} — 275–825-$\mu\mu$fd. mica trimmer (Meissner 22–7007).
C_{CP} — 30-$\mu\mu$fd. mica trimmer (National M-30).
C_{CS} — 45–260-$\mu\mu$fd. mica trimmer (Hammarlund CTS-160).
C_{DP} — 45–260-μfd. mica trimmer (Hammarlund CTS-160).
C_{DS} — 175–500-$\mu\mu$fd. mica trimmer (Meissner 22–7005).
C_{EP} — 175–500-$\mu\mu$fd. mica trimmer (Meissner 22–7005).
C_{ES} — 45–260-$\mu\mu$fd. mica trimmer (Hammarlund CTS-160).
C_{FP} — 275–825-$\mu\mu$fd. mica trimmer (Meissner 22–7007).
C_{FS} — 21–100-$\mu\mu$fd. mica trimmer (Meissner 22–7002).
R_1 — 50,000 ohms, ½-watt.
R_2 — 25,000 ohms, 1-watt.
R_3 — 250 ohms, ½-watt.
R_4 — 40,000 ohms, 1-watt.
S — Sections of 5-gang, 6-position switch assembled from Centralab switch-kit parts.
L_1-A — 2 turns No. 24 enam. on same form with L_2-A.
L_1-B — 4 turns No. 24 enam. on same form with L_2-B.
L_1-C — 10 turns No. 28 d.s.c. on same form with L_2-C.
L_1-D — 0.25 mh. (Miller No. 610 r.f. choke).
L_1-E — 2.5 mh. (Miller No. 640 r.f. choke).
L_1-F — 15 mh. (Miller No. 690 r.f. choke).
L_2-A — 2.5 μhy., 20 turns No. 24 enam., ½ in. diam., ¾ in. long (National PRD-2 form). NOTE: This coil requires a 45–260 $\mu\mu$fd. series trimmer between switch point 2-A and the top of the coil.
L_2-B — 4.6 μhy., 16 turns No. 24 enam., ¾ in. diam., 9/16 in. long (National PRF-2 form).
L_2-C — 28 μhy., 50 turns No. 28 d.s.c., ¾ in. diam., close-wound (National PRF-2 form).
L_2-D — 0.25 mh. (Miller No. 610 r.f. choke).
L_2-E — 2 mh. (Miller No. 640 r.f. choke, 30 turns removed).
L_2-F — 15 mh. (Miller No. 690 r.f. choke).
L_3-A — 12 turns No. 24 enam., ½ in. diam., ⅝ in. long (National PRD-2 form).
L_3-B — 18 turns No. 22 d.s.c., 9/16 in. diam., close-wound (National PRE-3 form).
L_3-C — 30 turns No. 24 d.s.c., ¾ in. diam., close-wound (National PRF-2 form).
L_4-A* — 5 turns No. 30 close-wound on same form with L_3-A.
L_4-B* — 8 turns No. 30 close-wound on same form with L_3-B.
L_4-C* — 20 turns No. 30 close-wound on same form with L_3-C.
L_5, L_6 — I.f. transformer made from National R-300 1-mh. r.f. choke as follows: Remove top pie entirely. L_5 consists of upper remaining pie with 75 turns removed. L_6 consists of lower pie with 150 turns removed.

* Tickler and oscillator-grid coils should be wound in the same direction. Connect outer end of grid winding to grid (through switch), outer end of tickler winding to plate (through switch), inner end of grid winding to ground and inner end of tickler winding to B+.

ke. and the output winding, L_6, is designed to couple to the input of the ham-band receiver. C_3 is provided so that accurate tracking adjustments will not be necessary. This also permits the tuning control of the ham-band receiver to be used for band-spread tuning, C_3 being used to trim up the input circuit with changes in the i.f.



Bottom view, showing the switch and shielding assembly. The tube is mounted under the steel box with the i.f. transformer attached at the rear.

Mechanical Assembly

The dual tuning condenser, C_1-C_2, is mounted on a standard steel box 4 inches square and 2 inches deep. The five-section ganged switch is supported by plates of metal, *C* and *D*, shown in Fig. 2, with the plate *D* fastened to the front edge of the box and the plate *C* at the back. The fact that the switch frame is longer than the box is taken care of by inserting the plate *C* as one of a series of spacers between the last two sections of the switch. Plate *C* also serves as a mounting for the three lowest-frequency antenna coils, L_1-*D*, -*E* and -*F*. Also inserted as one of the spacers between the third and fourth sections of the switch is the plate *B* (Fig. 2), which provides a mounting for the low-frequency grid coils, L_2-*D*, -*E* and -*F*, and also forms a shield between the oscillator and mixer coils. The switch frame forms the only support for the plate *B*.

Midway between the plates *B* and *C* is a plate *A* with socket-punch holes covered with small electro-static shields to prevent direct pickup of high-frequency signals over the low-frequency ranges. This plate *A* is suspended between *B* and *C* by means of ⅝-inch spacers.

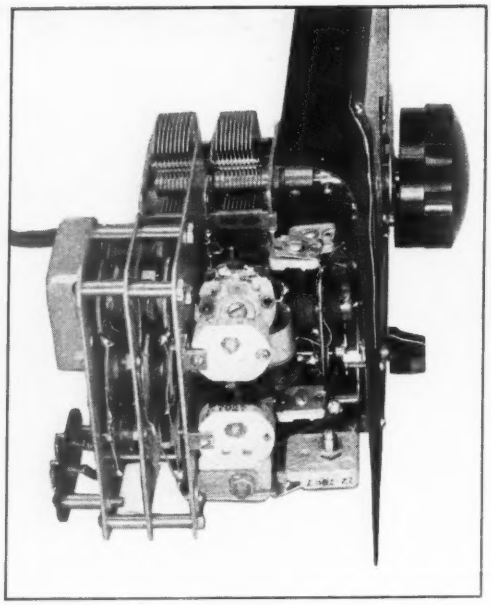
The switch-assembly spacers and the mounting plates are arranged along the switch frame so that the front switch section comes ½-inch behind the switch end plate, the second switch section one inch behind the first, the third section 7/16-inch behind the second, plate *B* ⅜-inch behind the third switch section, the fourth section ⅝-inch behind plate *B*, plate *C* 11/16-inch behind the fourth switch section and the fifth section ¼-inch behind plate *C*. Holes for this assembly are shown in the sketches of Fig. 2. The various pieces of metal fit together to form a rigid unit.

The dual condenser should be mounted so that its stator terminals come close to the pole terminals of the third and fourth switch sections which switch the oscillator and mixer grid circuits, respectively. With the particular condenser shown, the location of the mounting screws made it possible to mount the condenser overhanging the edge of box somewhat to a point where the stator terminals almost touched the switch pole terminals. Spacing under the condenser should be used, if necessary, to elevate the shaft sufficiently so that the mechanism of the National ACN dial will clear the top of the box.

The 6K8 socket is mounted in the side of the box so that its base connections will be short. A hole, which shows in the top view, is drilled in the box above the mixer-grid terminal at the cap of the tube so that a short connection may be made to the stator of the rear condenser section. Several holes are drilled in the box to provide ventilation. The mixer trimmer condenser is mounted in the front edge of the box to balance the switch-gang shaft.

The oscillator coils and the coils for the three highest-frequency ranges of the mixer are wound on small-diameter polystyrene forms and are terminated with pieces of No. 18 or 20 wire so that they may be supported by soldering these terminating wires directly to the switch terminals. The trimmer condensers are located as close as possible to their corresponding coil and switch terminals. The heavier ones are mounted by small angles on plate *B*, while the lighter ones are supported by heavy-wire connecting leads. In placing these condensers, some thought should be given to accessibility for adjustment.

Standard lattice-wound r.f. chokes are used for the mixer coils for the three lowest-frequency ranges. They are mounted in place by means of *brass* machine screws through their centers. The wood cores of the two largest coils are removed and replaced by shorter lengths of dowel or short polystyrene forms (National type PRD-1) to provide a uniform core length for all six low-frequency coils.



Side view, showing the three sets of low-frequency mixer and antenna coils with the electrostatic shield in place. Also shown are the various oscillator trimmer condensers.

Making Electrostatic Shields

The electrostatic shields consist of a series of No. 20 d.s.c. parallel wires, spaced about twice the diameter of the wire. These wires are connected together at one end but *not* at the other. Shields of this type may be made quite readily by winding the wire tightly around a piece of ¼-inch board or Presdwood about 3 inches wide to a length of about 3 inches. The edges of the board should be rounded off to prevent humping of the wire as it goes over the edges of the board. When the winding is finished, the insulation from each turn is removed at one end. A connecting wire is soldered across the turns, leaving sufficient extra length at each end of the connecting wire for making a ground connection when placed in the converter. A sheet of celluloid longer than the winding length, but somewhat shorter than the length of the turns, is then slid under the turns and the wires are cemented to the celluloid with Duco cement diluted with nail-polish remover. The same process is repeated on the reverse side of the board. The turns of wire are then cut at the edges of the board to form two sections of shielding, each of which may be sliced in half to form four shields of sufficient size to cover the openings in plate *A*. A base of celluloid is then cut to match plate *A* in size and shape. Upon this base the individual shields are cemented in proper position.

In tuning, it is best to start with the standard broadcast band, since it is most important to cover this band in one coil range. The circuits for the other frequencies may be made to overlap each end of the b.c. range and each other in progression. With the converter output terminals connected to the input terminals of the receiver, the latter should be tuned to 2000 kc. and C_4 adjusted for maximum noise. The dual condenser should then be set at minimum capacity and C_{DP} adjusted to bring in the high-frequency end of the band. As soon as a signal is heard, C_4 should be adjusted for maximum response. With C_1-C_2 at maximum capacity, C_{DS} should then be adjusted to bring in the low-frequency end of the band. A slight further juggling of C_{DP} and C_{DS} may be necessary to bring in both ends of the

(*Continued on page 70*)

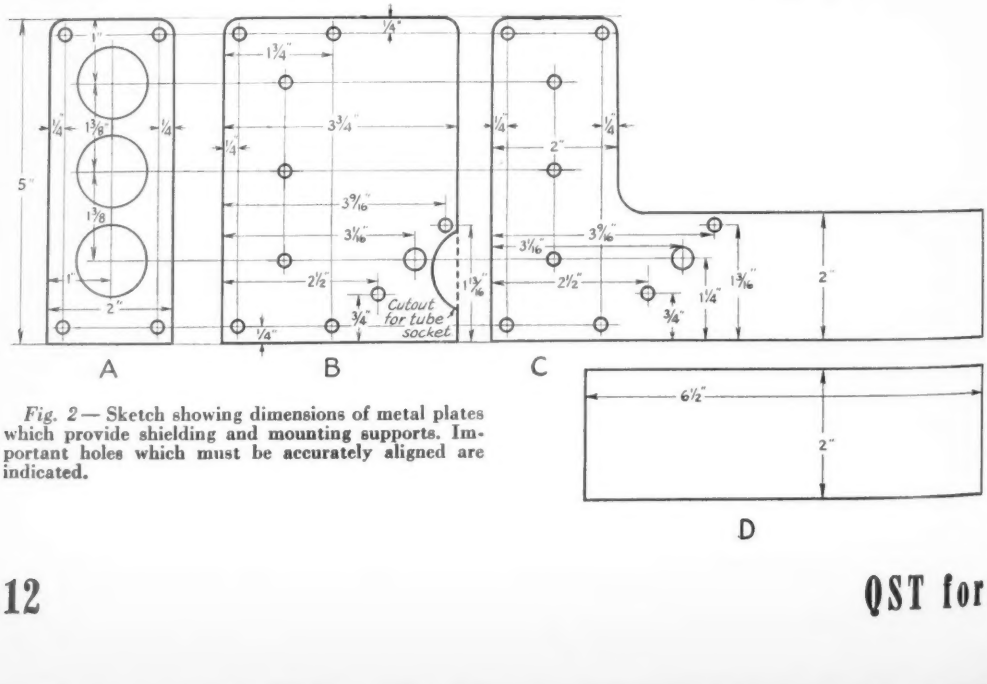


Fig. 2 — Sketch showing dimensions of metal plates which provide shielding and mounting supports. Important holes which must be accurately aligned are indicated.

The Providence Police Mobile Radio Patrol

How One American City Solved the ARP Communications Problem

BY REV. CHARLES F. MAHONEY,* WIBBA, AND PERRY O. BRIGGS, WIBGF**

In March *QST* (pp. 7 and 52) we reported that Providence, Rhode Island, had embraced a plan for using amateur operators and converted amateur equipment for civilian defense communications in a special u.h.f. police radio auxiliary system made up of licensed amateurs. Now the sponsors of the project tell in detail the story of how the Mobile Patrol came into being.

The Providence Police Radio Patrol is 100% amateur radio. Father Mahoney, Vice-Chancellor of the Diocese of Providence, Director of the Patrol, has been on the air as an amateur since 1909. Perry Briggs, radio engineer of the City of Providence, is also an old-time ham with a varied experience — including one-time membership on the ARRL Hq. staff, collaborating with Ross Hull during the 1929 Technical Development Program.

The basic idea of the Mobile Patrol has already been proved in practice. In the first official test on Feb. 16th, the complete roll-call of ten sector stations — the locations of which are kept secret for military reasons — was completed in 45 seconds flat. Following this test, Father Mahoney stated: "The success of the system is now assured. The achievements thus far indicate that the system will far exceed our fondest hopes in our wildest flights of fancy."

Representatives of neighboring cities who witnessed the tests declared their intention of proceeding along similar lines. Typical of the reactions was that of Chief Crosby of East Providence, who declared: "We're just waiting to swear the men in and give them police authority." Additional systems based on the Providence plan are now in process of organization in these cities.

THE Communications Division of the Providence Civilian Defense Organization in its constitution provided for a radio service known as a Mobile Radio Patrol. It was planned to have 20-watt transmitters in automobiles, operating on the 2½-meter amateur band, powered from the automobile storage batteries. The owners and operators of these cars were to be the amateurs of the city of Providence. This Patrol was to function upon failure of the commercial means of communications — the telephone, telegraph, teletype, and the usual police radio.

To stress the importance of this work and to give it proper emphasis, the Mayor of Providence, as coördinator of the Civilian Defense Organization, established the Patrol as a part of the Communications Division of the CDO. Then the Mayor appointed a director with authority to petition the FCC for reactivation of the amateurs who were to operate the equipment. Accordingly, the amateurs in Providence received forms describing the Mobile Radio Patrol, together with questionnaires and applications for membership. Upon completion of these forms, the amateurs described their apparatus, pledged their equipment and free time to the Patrol, and agreed to abide by the rules made for its proper functioning.

*26 Pond St., Providence, R. I.
** 21 Alexander, Providence, R. I.

In due course the applications were received, acknowledged and filed. Membership cards and automobile insignia provided by the city of Providence were ready for distribution. Petition was made to the FCC listing the amateurs to be reactivated. The petition described the origin, function and personnel of the patrol, asked authority only for the operation of fixed-movable stations on the 2½-meter amateur band for test purposes, one day and one night each week, and requested authority for individual tests of key stations for periods not exceeding one hour. Schedules of all activities were, according to the petition, to be filed with the local monitoring station of the FCC well in advance of the use of the privileges requested. This petition, in legal form, was signed by the Director, and then countersigned and recommended by the Governor of Rhode Island and by the Mayor of Providence. It was sent directly to the Defense Communications Board. Its pendency was fostered by the U. S. Senator from Rhode Island, Mr. Green.

FCC Petition Fails

This petition, though modest in its demands, and made on behalf of the city of Providence, situated on the Atlantic seaboard within the critical defense area, the second largest city in New England, failed of action because of the later

ruling of the FCC withdrawing all reactivating authority.

The Providence Mobile Radio Patrol of the Communications Division of the Providence Civilian Defense Organization was fully organized. Its work was well planned. It was proud of and exultant in the full coöperation of the Providence amateurs. But in this manner it became a paper organization awaiting the further action of the FCC authorizing its function as a last line of communication for the CDO of the city of Providence.

This civilian patrol is still in full force and effect — on paper. It takes its place with so many other defense bodies, with eyes toward Washington for authority to carry out the purposes for which it was organized. It is now ready, as an amateur organization, to use the amateur frequencies and amateur equipment in such manner and measure as will be the pleasure of the FCC when and if forthcoming.

But the need for that last line of communication did not disappear with the issuance of the repealing order of the FCC. An independent unfailing system of radio communication for the report center was still imperative. The city of Providence, determined to protect itself from the confusion and chaos which would most certainly follow upon even the slightest air attack or sabotage in its defense area, found it necessary to turn away with heavy heart from the ever-dependable hams and their equipment, and look to the commercial operators and to commercial equipment to furnish communication. Logically, the city turned first to its own police radio system.

As is known by all, there are ultrahigh frequencies allocated on an experimental basis to police radio. The city of Providence, therefore, through its police department, in full compliance with every regulation of the FCC, made application in the usual manner for a construction permit for a u.h.f. police radio transmitter.

The applications and petition were found in order. A permit to make tests on specified frequencies under the call letters W1XVI was issued to the Providence police department. The equipment licensed specifically by the FCC was the property of the department.

Operators Needed

Its equipment now licensed, the police department was in need of personnel skilled in the care and operation of ultrahigh-frequency equipment. This could not be readily recruited from the commercial operators. At least fifty operators were needed at once.

At a meeting of the members of the Civilian Defense Patrol, held at the Providence report center immediately upon receiving the experimental licenses, the amateurs of Providence were told of the u.h.f. police equipment. Mr. William A. Needham, the city solicitor; Mr. James A. Williams, head of the communications division of the CDO; local officials of the ARRL and representatives of some of the nearby communities attended this meeting.

The proposed police radio system was fully explained to the amateurs. The city of Providence possessed radio equipment of the kind licensed by the FCC, frequency-measuring devices and the like. Six units were owned by various amateurs recruited from the members of the police department. Realizing that it was police equipment, being operated on police frequencies, the personnel should be members of the Providence police department. Time was of the essence. To engage paid personnel and adequate equipment was impossible, due to lack of available operators and funds. The only alterna-

Twenty-six Providence radio amateurs being sworn in as policemen before members of the Bureau of Police and Fire. Framed in the doorway, center left, is Perry Briggs, W1BGF, police department engineer. Immediately in front of him, at right, is Father Mahoney, W1BBA–W1TN, Director of the Mobile Patrol.

tive was to recruit for the Providence police department, from the civilian patrol, men and equipment to give the necessary service.

Everyone present was polled and asked his opinion and pleasure. Unanimously, the amateurs expressed their desire to join the Providence police department. Then and there all made application for membership on the Providence police, and they pledged their free time and equipment for the operation of the new Providence police radio system.

Amateurs Serve Without Pay

The question of compensation was still to be disposed of. As members of the Providence police department, they were entitled to the same compensation as any other patrolman. An appropriation being lacking to pay in full for an increased membership of some fifty qualified men, however, it was necessary for the city of Providence to ask that rights to compensation and other financial privileges be waived. The radio amateur, whether in police uniform or in any other form of life, is in radio for the love of the art and for the service he can give to city and country by means of that art. So each one readily waived rights to all compensation to which he is justly entitled as a member of the Providence police department.

In due course all the members so signing up were appointed patrolmen and assigned to such radio work as the Bureau of Police and Fire, the Chief of Police and the director of the Providence Police Mobile Radio Patrol from time to time should direct. Under-age members of the civilian defense unit were not admitted to membership on the Police Patrol. Within one week after the issuance of the licenses by the FCC to the Providence police department, forty-five men had signified their willingness to join the police unit. At this writing nearly all have taken the oath of office and thus qualified as members of the Providence police department. Twenty-six were sworn in at one session in the presence of the full Bureau and chiefs of the departments.

Fifty Members in Police Patrol

The Bureau of Police and Fire, in establishing the patrol, authorized its complement as of fifty members. This includes a director, a captain, a lieutenant, ten sergeants and thirty-seven patrolmen. The original plan of the civilian patrol to have a "fixed-movable" transmitter in the center of each of the eight equal geographical sections of the city of Providence was carried out in the police unit.

One week after the swearing in of the greater portion of the radio patrolmen, the stations were in location and ready to operate. The transmitter in the Providence report center is crystal-controlled as authorized, with a power of three watts. Tests proved that the sites selected for the fixed-movable stations were satisfactory. Each of these fixed-movable stations is serviced from the ground by a transceiver, powered by dry cells. In this manner the entire city of Providence is connected to its report center by a network of u.h.f. transmitters, installed, maintained and operated by its police department. Each station is in charge of a sergeant and is manned by him with four patrolmen.

Among those recruited from the civilian defense organization were six men with first-class radiotelephone operators' licenses, and two with restricted telephone operators' permits. With any one of these six first-class operators in charge of the operations at any control point, the other stations, "fixed-movable" or "transceivers", can be operated as remotely-controlled units by any members of the Providence police department.

In addition to the eight fixed-movable stations and the normally-controlled stations at the report center, there are transmitters at police headquarters, fire alarm headquarters, and in the control room of the main Providence police radio station, WPGF. There is a further police transmitter used as the official monitoring station of the Providence Police Mobile Radio Patrol,

(*Continued on page 66*)

RADIO PATROL

An Editorial in The Providence Journal, *February 16, 1942:*

As an example of intelligent initiative and foresight the Providence Mobile Radio Patrol merits particular praise as one of the most practical and progressive of the local civilian defense activities to date.

Its importance far exceeds its size. This group of radio amateurs, organized under the direction of Rev. Charles F. Mahoney, and working now in the police department with police equipment, will perform a vital emergency function by keeping an immediate line of communication open in defense operations even if ordinary telephone and radio station facilities are cut off.

Although the system is yet to be tested on a city-wide scale, it already has proved so workable and essential a part of the defense program here that police departments, defense councils and other organizations elsewhere are greatly interested.

Providence, first to establish this radio patrol plan which "may well become the model for many other American cities," can continue the good work by being equally resourceful and energetic in all necessary forms of civilian defense.

★ HAPPENINGS OF THE MONTH ★

THERE is now so much to be reported in this department every month that we have to write it briefly and warn you that in most cases we won't have space to mention a subject oftener than once. Keep yourself posted on what is going on by reading this department each month, and write ARRL Headquarters if you need fuller information on any topic.

OPERATOR LICENSING RESUMED

FCC, on February 24th, announced the resumption of the licensing of new amateur operators. Existing licenses have been renewed or modified upon application right along, but no new licenses have been issued since Pearl Harbor. Something like 1500 pending applications from persons who have passed the amateur exam are now being issued, provided that proof of citizenship has been made as required by Order 75; and the road is clear for the prompt handling of future applications. Amateur examinations are being given on the schedule which appeared in February *QST*, page 24. No new station licenses have been granted.

THE A.R.R.L. APPARATUS BUREAU

ARE you having a hard time finding enough money to buy as many Defense Bonds as your conscience tells you you should? Could you use an idea that might enable you to do so, while at the same time helping the war effort in another respect and assuring you the funds for that new station you will want to build when the shooting is over?

There is a shortage of radio equipment. The military services of the United Nations have billions of dollars' worth on order, but sometimes they can't get deliveries of it fast enough to take care of desperate needs. What amounts to the same thing, several essential civilian services such as police and aviation are experiencing a similar problem. (Same thing, because if they could get their equipment elsewhere it would release apparatus for military use.) Many of these situations simply won't wait for 60- or 90-day delivery and the war is moving with such rapidity that the supply problem threatens to be worse before it is better. Several of these agencies have, therefore begun to look for amateur equipment and ARRL Headquarters has received a considerable number of requests to help. We have, therefore, determined to set up an apparatus bureau which will undertake to have information available on where the needed apparatus may be found for national-defense purposes.

The need is for standard manufactured equipment that is now in amateur stations. There is no interest in our homemade gear, howsoever good, because each such piece of apparatus is unique and the ham who built it would have to be thrown in to show how to adjust it and twiddle the dials. But there is interest in the manufactured transmitters of standard makes, in all powers up to a kilowatt, chiefly 'phone but also c.w., chiefly in the 2- to 8-Mc. region but extending to 30 Mc.; and there is also an interest in factory-built u.h.f. equipment. We have had quite a few inquiries for communications-type receivers. We foresee a shortage of crystals and we know that there is one on separate meters, since it is taking 150 days to get deliveries on some types.

It is far from our wish to spread the false impression that you might as well sell your station because you'll never have a chance to operate it, but it does seem to be a matter of patriotic necessity to find some equipment available for urgent needs. Please understand that ARRL is not buying apparatus. We're simply inviting you, if you are willing to dispose of your factory-made gear as a patriotic act, to advise us of its availability and your selling prices. We centralize the information here and have it ready for the inquirers, the same as we do in personnel matters.

On an adjoining page is a registration form which please fill out and file with us if you have anything you care to sell (or reproduce the form if you wish to avoid cutting your *QST*). Don't list anything that you are likely to need in civilian defense programs, particularly self-powered 2½-meter gear. Surplus manufactured u.h.f. apparatus for a.c. supply may be listed. For heaven's sake, keep your receiver if you enjoy listening in and are likely to have intercept or other wartime jobs to do, as it will probably become impossible to buy a new one. As to what your equipment is worth, we can't answer that for you. If it is fairly new and has had excellent care, it may be worth practically what it cost. If it's had hard service, or if you anticipate moving about and are eager to dispose of it, it may be well to price it considerably below cost. If you are willing to part with it only in the event of great need, it could even be priced higher than cost. Our suggestion on the average would be to consider a fair depreciation, but to add enough to cover the cost of packing and crating.

This is one more ARRL service, one in which you may realize your desire to see your equipment

Radio Apparatus for War Use

ARRL, 38 La Salle Road, West Hartford, Conn.:

I'll sell the apparatus listed below at the prices stated, for use in the war, condition guaranteed as stated, securely crated or properly packed, delivered to transportation agency in my city.

....
Date *Name* *Call*

....
Street Address *'Phone Number*

.....
City and State

Manufactured Transmitter. Make: ..... Model No. ..... Mfr's rating ..... input watts output final. Phone or c.w.? ..... Operates from ..... -volt mains at ..... cycles. Frequency range: ..... to ..... kc. Includes all coils for ..... bands. Includes crystals at ..... kc. Includes following auxiliaries: .....
.....
Dimensions ..... by ..... by ..... Weight ..... lbs. Date acquired: ..... Cost $.....
Condition: ..... Alterations made by me: .....
My price f.o.b. cars, $.....

Manufactured Receiver. Make: ..... Model No. ..... If plug-in coils, includes coils for ..... kc. If separate power supply, is supply included? ..... Cycles .....
Includes following auxiliaries: ..... Date acquired: ..... Cost $.....
Condition: ..... Alterations made by me: .....
My price f.o.b. cars, $.....

Manufactured U.H.F. Gear. Describe in general form as above. Attach extra pages if necessary. State band, whether xmtr, receiver or transceiver, type of power supply.

.....
.....
.....

Extra Crystals, Mounted, not included in transmitters above. Taking one line for each, state make, model, frequency, condition, price.

.....
.....
.....

Extra Meters, not included in above equipment. Taking one line for each, state make, model, type, range, condition, price.

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.....

doing useful work for the United Nations until the time comes when you want to change your bonds back into what-makes-signals. We're writing in late February; the situation may be pretty tough by April. Send that form to us right away!

SOME STAFF CHANGES

QST is lending three more skilled members of its editorial staff to the prosecution of the war. During February we bade a temporary farewell to Byron Goodman, W1JPE, assistant technical editor; Vernon Chambers, W1JEQ, conductor of the technical information service; and Clark Rodimon, W1SZ, our managing editor. On leaves of absence from here, they will all be associated with research and development work on confidential devices, with companies under contract to the government.

Clinton B. DeSoto, W1CBD, ex-W9KL, for many years an assistant secretary of the League, becomes assistant editor of *QST*. Long a fluent contributor to the magazine, both of special articles and regular departments, he will now labor exclusively in the editorial department. In addition to staff writing he will also be responsible for the production of our publications, with the competent assistance of the department's gal standby, Mrs. Louisa Dresser, now appointed editorial assistant. DeSoto has been an amateur for eighteen years, a member of the headquarters staff for twelve. He is perhaps best known as the historian of amateur radio, being the author of two well-known books in this field, "Two Hundred Meters and Down — The Story of Amateur Radio," and the more recent "Calling CQ." His technical interests have ranged all the way from the important but unspectacular field of measurements and measuring equipment, on which he has regularly contributed the *Handbook* chapter, to the radio control of model aircraft, a field in which he has done considerable experimental work, with contributions to *QST*'s pages. As an assistant secretary he has been in just about every part of the country on speaking trips before affiliated clubs and conventions, and so is well known to most of the gang.

Walter E. Bradley, W1FWH, of Greenwich, Conn., is a new member of the editorial staff, primarily succeeding to the technical information service. He brings to this desk a considerable background of radio teaching, which is right down the alley. And we don't believe we have previously chronicled the presence on the staff of Julius Galinsky, W1LOP, as a laboratorian, now a fixture after some summers spent with us on the *Handbook* programs.

TRAINING AIDS

If you're organizing a training class for radio theory, write to ARRL for the outline of a radio course based upon the new special defense edition of *The Radio Amateur's Handbook*. The new book has been specially compiled to serve as a text in radio training courses and is already doing that job splendidly.

Anything we amateurs can do to train the youths of the country in code before they enter military service will be a very valuable help. The League has on file at Washington now a proposal whereunder we would collaborate with a government agency in the establishment of code classes in public schools all over the country. If this doesn't go through, we'll probably launch such a program on our own as a strictly amateur matter. We have some dope on code teaching, too; write the Communications Manager. Incidentally, the defense edition of the *Handbook* has a new chapter on learning the code which is written from a fresh viewpoint based upon recent experience; it too will help.

ARE YOU LICENSED?

When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

SERVICE RECORDS WANTED

How many of us are there in the wartime service of the country? By a roundabout way of putting a lot of factors together, it is our belief that there are now probably 12,000 licensed amateurs serving with the armed forces of the United States. But ARRL headquarters has an actual record, by names, of only a small part of that number. We would like to compile at this place the service record of the amateur in war. It has many uses, some of them quite important to our welfare. We invite and request every amateur serving with the military forces to report to us what branch he is in, his rank or grade or rating, and anything that it is wise to say about the identity of his outfit or the nature of his duties — but nothing that it is unwise to say! And if there is a gang of hams at your place and you know they haven't been registered at ARRL Hq., we'd appreciate it very much if you would send in their calls and similar dope for them.

We're similarly interested in the record of amateurs serving as civilians in essential wartime radio tasks — laboratorians, engineers, draftsmen, mechanics, etc. — if it's part of the national defense. A postcard will let us get you into our statistics and the record of those who are helping.

OPEN TO AN OFFER?

Our registrations of the availability of experienced radio personnel have permitted us to set up a bureau at Hq. that has been very valua-

ble in locating amateurs for defense positions of every description. We ourselves have been surprised at the success we have oftentimes experienced in this work, and we have received letters of appreciation from several government offices and defense contractors. We have tied hundreds of hams into defense work, either in uniform or civilian status, and consider it one of the most important things ARRL is doing.

The nation needs to have every radio man working on a radio job. Is full use being made of your radio talents? Are you open to an offer of change of employment, in radio work associated with national defense, either military or civilian? If so, please register the fact with us either by filling out that form that appeared on page 27 of December *QST* or by writing out your own form in similar style. Good jobs are available, particularly for those with technical schooling, and we can help you to help both yourself and the national effort. Write ARRL, West Hartford.

ELECTION NOTICE

To all members of the American Radio Relay League residing in the West Gulf Division:

You are hereby notified that, because of the resignation of Director William A. Green, W5BKH, account nonresidence in the division, and the death of Alternate Director W. T. Caswell, Jr., W5BB, acting director, a special election is about to be held in your division to elect both a member of the ARRL Board of Directors and an alternate thereto, for the remainder of the 1941–1942 term and for the following two-year term, 1943–1944. Your attention is invited to the provisions in the Constitution and By-Laws for the government of ARRL by a Board of Directors, defining their eligibility, and providing for the nomination and election of directors and their alternates. Copy will be mailed any member upon request.

You are particularly cautioned to observe that, in order to permit the selection of a new director in time to represent you at the annual meeting of the Board of Directors in May next, less time than is customary is being provided for each action in the process of choosing the new director and alternate. The time will be ample for the requirements of each step in the process, but your reasonably prompt action is required. Nominations will close April 6, 1942; ballots will be mailed from the headquarters office as soon thereafter as possible; voting will take place between about April 10th and noon EWT of April 30, 1942. The result will be determined as quickly thereafter as possible; and the new director and alternate will take office immediately upon that determination. The ballots will list in one column the names of all eligible candidates nominated for the office of director by ARRL members residing in the West Gulf Division; and, in another column, all those similarly named for the office of alternate. Each member will indicate his choice for each office. If there be but one eligible nominee for an office, he will be declared elected without balloting.

Nomination is by petition. Nominating petitions are hereby solicited. Ten or more ARRL members of the West Gulf Division may join in nominating any eligible member of the League residing in that division as a candidate for director therefrom or as a candidate for alternate director therefrom. No person may simultaneously be a candidate for the offices of both director and alternate. Inasmuch as the by-laws were recently amended to transfer all the powers of the director to the alternate in the event of the director's death or inability to perform his duties, *it is of as great importance to name a candidate for alternate as it is for director.* The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
West Hartford, Conn.

We, the undersigned members of the ARRL residing in the West Gulf Division, hereby nominate ....., of ....., *as a candidate for DIRECTOR;* and we also nominate ....., *of* ....., *as a candidate for ALTERNATE DIRECTOR; from this division for the remainder of the 1941–1942 term and for the 1943–1944 term.*

(*Signatures and addresses*)

The signers must be League members in good standing. The nominee must have been both a member of the League and a licensed radio amateur operator for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination, except that a lapse of not to exceed ninety days in the renewal of the operator's license and a lapse of not to exceed thirty days in the renewal of membership in the League, at any expiration of either during the four-year period, will not disqualify the candidate. He must be without commercial radio connections: he may not be commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in radio communication or experimentation, nor commercially engaged in the publication of radio literature intended, in whole or part, for consumption by licensed radio amateurs. Further details concerning eligibility are given in By-Law 12. His complete name and address should be stated. The same requirements obtain for alternate as for director. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon EWT of the 6th day of April, 1942. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to

more than one petition for the office of director and one petition for the office of alternate. To be valid, a petition must have the signatures of at least ten members in good standing; that is to say, ten or more members must join in executing a single document; a candidate is not nominated by one petition bearing six signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are frequently found not to be members in good standing. It is not necessary that a petition name candidates both for director and for alternate but members are urged to interest themselves equally in the two offices.

Classification of members into Full Members and Associates is still in process, occurring at time of renewal throughout coming months. Members possessing certificates of Full Membership, and members not yet classified and holding valid old-style membership certificates, may nominate candidates, or may stand as candidates if otherwise eligible. But members holding certificates of Associate Membership are not eligible to either function.

Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:

K. B. WARNER,
Secretary

January 27, 1942

LEND-LEASE FOR E.S.M.D.T.

LAST month in this column we reported the formation of ESMDT radio courses all over the country; see page 20, March *QST*. The classroom work involves demonstrations. As we all know, it is most difficult to obtain new equipment. Many of these courses would like to get apparatus and parts from amateurs. They need laboratory instruments, tubes, resistors, chokes, condensers, meters, wavemeters and so on. If you're interested in helping along this good work, get in touch with the state coördinator of the radio program if you know who he is, or with the nearest electrical-engineering school or the chief engineer of the nearest major broadcasting station, all of whom are probably engaged in the work. Most of the schools have funds to purchase equipment; some may prefer to rent apparatus; or in cases where you may wish to lend gear, they'll have money to restore it to original condition if it becomes damaged. Such arrangements should be worked out locally in each case. You'll be giving a lift to worthy work.

LISTEN ON 600

IF YOU want to hear a lot that is going on, take a listen on 600 meters and you'll find yourself doing it night after night. Unbelievable DX, too, if the static doesn't get you.

But don't forget about secrecy. What you hear there is your own business, but it's not yours to tell. It of course is of the greatest national importance that we be utterly close-mouthed about movements of ships and troops and the happenings along our coasts. Good training, though.

FINANCIAL STATEMENT

LEAGUE business affairs showed splendid progress in the last quarter of 1941 because of the appearance of the new edition of the *Handbook*. Thereby the League rounded out a nice year from the business standpoint, well prepared to endure the stress of war. At the instructions of the Board, the fourth-quarter operating figures are here given for your information.

STATEMENT OF REVENUE AND EXPENSES, EXCLUSIVE OF EXPENDITURES CHARGED TO APPROPRIATIONS, FOR THE THREE MONTHS ENDED DECEMBER 31, 1941

REVENUES		
Membership dues	$19,839.24	
Advertising sales, *QST*	19,547.77	
Advertising sales, Handbook	6,979.76	
Newsdealer sales, *QST*	9,812.14	
Handbook sales	29,902.57	
Spanish edition Handbook revenues	59.00	
Booklet sales	4,577.83	
Calculator sales	581.65	
Membership supplies sales	2,832.84	
Interest earned	272.33	
Cash discounts received	271.50	
Profit on sale of capital asset	15.00	
Bad debts recovered	41.89	$94,733.52
Deduct:		
Returns and allowances	$ 1,969.82	
Cash discounts allowed	609.89	
Exchange and collection charges	94.57	
Increase in reserve for newsdealer returns of *QST*	322.42	2,996.70
Net Revenues		$91,736.82
EXPENSES		
Publication expenses, *QST*	$ 15,316.41	
Publication expenses, Handbook	23,369.13	
Publication expenses, booklets	1,643.35	
Publication expenses, calculators	780.60	
Spanish edition Handbook expenses	22.50	
Salaries	26,996.71	
President's defense expenses	118.80	
Membership supplies expenses	2,260.56	
Postage	1,430.00	
Office supplies and printing	3,892.68	
Travel expenses, business	1,025.46	
Travel expenses, contact	506.11	
QST forwarding expenses	906.08	
Telephone and telegraph	812.58	
General expenses	1,058.20	
Insurance	225.07	
Rent, light and heat	1,131.57	
General Counsel expenses	669.54	
Communications Dept. field expenses	202.35	
Headquarters station expenses	418.86	
Alterations and repairs expenses	293.92	
Bad debts charged off	309.06	
Provision for depreciation of:		
Furniture & equipment	272.80	
Headquarters Station	108.97	
Total Expenses		83,771.31
Net Gain before expenditures against appropriations		$ 7,965.51

A Pack Set for 112-Mc. Defense Work

Light-Weight Dry-Battery Equipment for "Walkie-Talkie" Operation

BY VERNON CHAMBERS,* WIJEQ

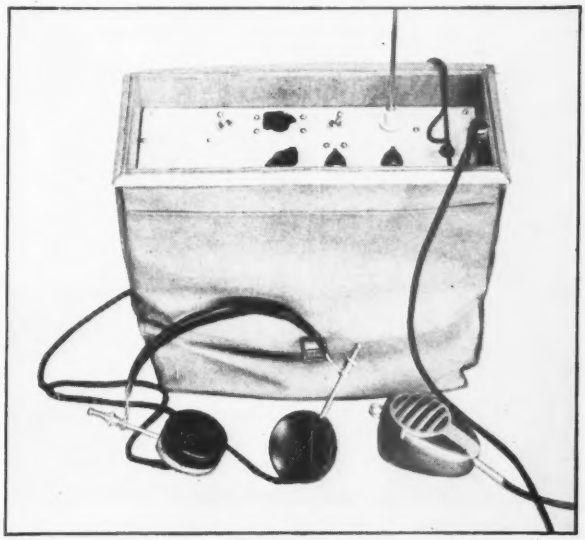
Here's a complete 2½-meter station that can be strapped to the operator's back. Not a transceiver — but neither is it complicated to build. A unit or two of this type should be included in any ARP emergency equipment set-up.

SOMEONE once said, "A chain is as strong as its weakest link." The statement suits many situations, including those which may arise in emergency communication. For instance, many of us have made plans for a control station at the local defense headquarters, have arranged for substations at firehouses, first-aid centers, and other essential points and, to complete the system, have provided one or two mobile rigs to fill in gaps.

Unfortunately, such a chain isn't as strong as might appear. Heavy bombing — or any other catastrophe — might rip up an area of several city blocks, and radio communication with the outside sections would be of valuable assistance to rescue crews operating within the damaged area. It is not unlikely that any apparatus that may have been installed in the affected area will be destroyed or otherwise rendered unfit for operation and that a mobile rig could not be driven in because of smashed roads or traffic conditions. While with suitable preparation [1] storage-battery powered equipment can be taken in, there is still a definite need for a light-weight outfit which can be carried, quickly and easily, anywhere in the area. It is desirable, for instance, to provide the person in charge of rescue work with instant communication to other points without having to use messengers. A pack set which can be carried by an operator who sticks right with him wherever he may find it necessary to go obviously is a handy piece of equipment. The omission of such light-weight portable gear might prove to be the weak link in an otherwise sound and solid chain.

There is already an abundance of constructional data on light-weight portable u.h.f. gear, and commercial transceivers can be secured at no great expense. However, we believe that the unit to be described includes features which make it even better suited to the purpose.

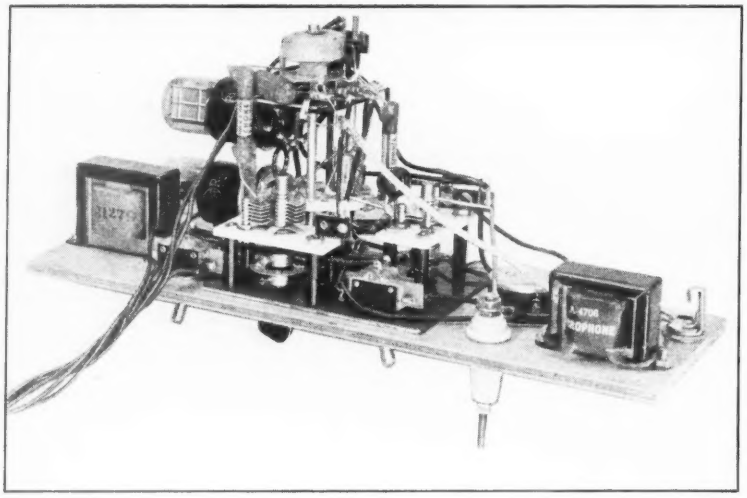
This "walkie-talkie" is a light-weight transmitter-receiver housed in an inexpensive canvas knapsack so that the outfit may be strapped to the operator's back. It uses two ordinary receiving tubes and has separate tuned circuits for transmitting and receiving. Individual tuned circuits permit the use of a high-*C* oscillator circuit in the transmitter for stability, along with a low-*C* detector circuit. These one-purpose *LC* combinations permit freedom in adjustment and tuning that cannot be attained with the ordinary transceiver circuit. The unit employs a single antenna which is automatically connected to the proper circuit by the send-receive switch. Optimum antenna coupling to each circuit is assured by individual coupling condensers for the transmitter and receiver. The carrying case is large enough to hold two complete battery supplies; a switch cuts in an entire new set of batteries in the event that the first set begins to wear out during operation in the field. These supplies are inexpensive, and slightly more than a hundred hours of operation may be expected from the dual pack. The cost of the layout is approximately $21, including tubes, two sets of batteries, knapsack and antenna, but not including the microphone and head-



The 112-Mc. pack set — complete and ready to go.

* Technical Information Service, ARRL.

[1] Grammer, "More Gear for Civilian Defense," *QST*, February, 1942.



Side view showing the transmitter tuned circuit in the foreground.

set. The complete station weighs 15¼ pounds.

Circuit Details

The circuit diagram of the unit is shown in Fig. 1. The separate tank circuits are connected to or disconnected from the 1Q5GT oscillator-detector tube by means of the change-over switch, S_1. The circuit becomes a superregenerative detector with S_1 in the "receive" position. The arrangement will be recognized as the "minuteman" circuit, with a small positive voltage applied to the grid of the tube. A straight ultraudion transmitting circuit is formed with S_1 in the "send" position. R_1 is the receiver grid leak and R_2 is the transmitter grid-leak resistor. The antenna condensers, C_3 and C_4, give capacity coupling between the two tank circuits and the half-wave antenna rod. Plate voltage is fed to both circuits through RFC_1 and RFC_2.

A second 1Q5GT tube is used in the audio circuit, which serves as the receiver audio amplifier in one case and as the modulator in the other. Proper circuit selection is accomplished by S_2. The four switches designated S_2 in Fig. 1 are not separate, but are sections of the 4-pole, 2-position bakelite wafer switch referred to in the list of parts. Transceiver transformers were not available at the time of construction and as a result an ordinary microphone transformer was used. Impedance coupling is used between the detector and audio circuits and between the microphone and the modulator. RFC_3 and C_7 form a filter which keeps the quench voltage out of the audio circuit. The condenser is disconnected from ground by a section of S_2

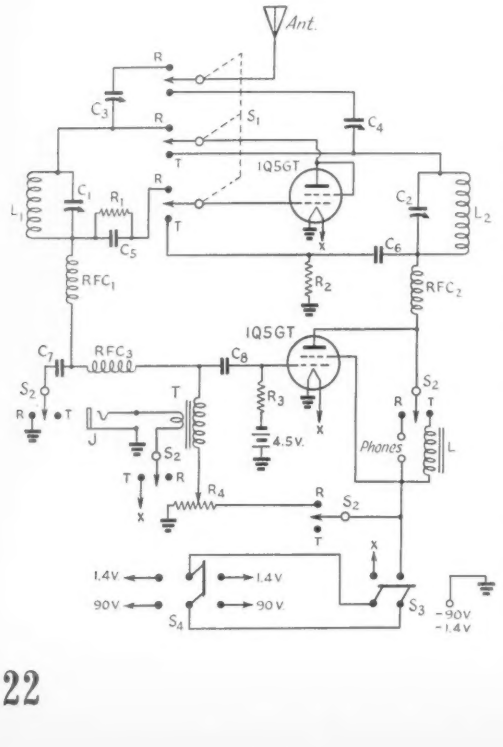


Fig. 1 — Wiring diagram of the knapsack station.

C_1 — 15-$\mu\mu$fd. midget variable (National UM-15 with one stator and two rotor plates removed).
C_2 — 35-$\mu\mu$fd. midget variable (National UM-35).
C_3, C_4 — 3-30-$\mu\mu$fd. padder (National M-30, Millen 28030, Hammarlund MEX, etc.).
C_5, C_6 — 100-$\mu\mu$fd. midget mica.
C_7 — 0.004-μfd. midget mica.
C_8 — 0.01-μfd. paper.
R_1 — 0.5 megohm, ½ watt.
R_2 — 15,000 ohms, ½ watt.
R_3 — 0.25 megohm, ½ watt.
R_4 — 50,000-ohm volume control.
RFC_1, RFC_2 — U.h.f. choke (Ohmite Z-1).
RFC_3 — 80-mh. r.f. choke (Meissner 19-2709).
J — Open-circuit jack.
S_1 — 4-pole, 2-position isolantite switch section (Centralab Z).
S_2 — 4-pole, 2-position bakelite switch section (Centralab M).
S_1 and S_2 mounted on Centralab index assembly No. K-122.
S_3 — D.p.s.t. toggle.
S_4 — D.p.d.t. toggle.
T — Single-button microphone to grid transformer (Stancor A-4706 or equivalent).
L — 15-henry, 40-ma. filter choke (Stancor C-1279 or equivalent).
L_1 — 3 turns No. 14 enam., ⅜-inch inside diam., 7/16 inch long.
L_2 — 1 turn No. 12 enam., ½ inch inside diameter.

when the unit is used as a transmitter; it is necessary to remove C_7 from the circuit so that the higher audio frequencies will not be greatly attenuated in transmitting. The microphone, which obtains its voltage from the filament battery, is disconnected from the battery during transmitting by another section of S_2. A third section of S_2 connects either the headphones or the modulation choke to the plate of the 1Q5GT. The regeneration control, R_4, causes no drain on the supply while transmitting because it is also disconnected by S_2. A "C" battery provides the bias for the audio tube. Since no current is taken from the "C" battery it should outlive the dual "A" and "B" supply.

A d.p.s.t. toggle switch, S_3, closes or opens the d.c. circuits of the walkie-talkie. Another switch, S_4, is used for shifting from one set of batteries to the other.

Construction

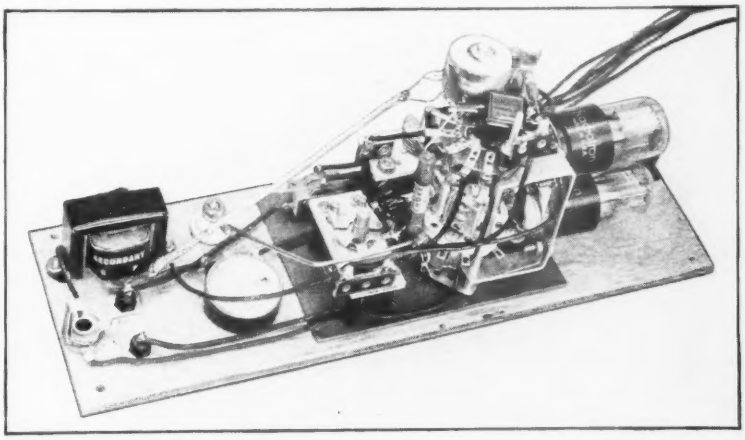
The knapsack is the first item to be secured. It may be purchased at most Army and Navy stores or from concerns which handle camping equipment. The one we picked cost $2.35 and measures 4½ by 12⅞ by 15 inches. A case to protect the radio gear is next made from ¼-inch plywood. The outside measurements of this box will depend upon the knapsack measurements. Our box measures 4½ by 12⅞ by 7½ inches. The sides and ends of the box are nailed to strips of wood ½ inch square. These strips are 5½ inches long and have their bottom ends flush with the bottom of the box. This type of construction allows the pack-set panel to be set down in the box to a depth of 2 inches and, as a result, the control knobs are down where they won't get bumped out of position after they have once been set. Glue and brads should be used freely when the box is being assembled. Strips of ¼-inch quarter-round trim may be tacked around the top edges of the case to prevent the latter from slipping down inside the knapsack. One or two coats of shellac will complete the job.

A panel that will fit inside the wooden box is next cut from a piece of ¼-inch plywood and given a coat of shellac. A 3½ by 5-inch piece of 1/16-inch aluminum (or other metal) is needed to shield the tuned circuits and prevent hand-capacity effects. Two brackets on which the tube sockets may be mounted also are required. The brackets are formed from metal strips measuring 1/16 by ½ by 5½ inches. The ends of the strips are bent down, leaving 2½-inch sections at the centers on which the sockets may be mounted. Holes are drilled in the ends of the strips so that the brackets may be mounted on the switch assembly. The idea is that the tube sockets and the switch sections may be grouped closely together for compactness and short leads.

It is important that the switch sections be assembled from the K-122 switch kit because the brackets will not fit on one of the shorter switch assemblies. After assembly, the switch brackets and wafers may be mounted, and it is suggested that the following procedure be followed: Insert the long support bolts through the switch index and slip a half-inch spacer (provided with the switch kit) over each bolt. Slip one end of each bracket over its bolt, add another set of ½-inch spacers and then mount the isolantite wafer with the contacts toward the front of the switch. Next use a set of 1¾-inch spacers and slip the free ends of the brackets into position. Place a set of lock washers on the bolts and mount the bakelite wafer with the contacts toward the rear. Add another set of lock washers and then use nuts to tighten up the entire unit.

The parts may now be mounted in the manner shown in the photographs. No specific measurements are given because it is quite probable that a different panel size will have to be used to fit other knapsacks. The r.f. section is behind the metal panel, with the tuning condensers mounted on 1-inch pillars as close to the isolantite switch as possible. Coils are soldered directly to the condenser terminals. RFC_3 is mounted on one of the support bolts of the switch section. The receiver and transmitter r.f. chokes are mounted vertically with their bottom ends connected to

(*Continued on page 62*)



The receiver tuned circuit is shown in this photograph. The antenna coupling condensers are mounted on the isolantite wafer switch. Phone and microphone jacks are at the left end. The regeneration control is to the right of the jacks.

★ U. S. A. CALLING!!!!!! ★

Urgent Needs Reported for Your Guidance

COMMISSIONS FOR RADAR TECHNICIANS

ONE of the most unusual opportunities for college-trained radio amateurs has recently been announced by the Navy Department. Commissions as radar engineers, in the Naval Reserve, are being granted to college graduates with engineering degrees who have had amateur or commercial radiotelegraph or radiotelephone experience, especially with high frequencies. These officers are then given a special four months' course in radio engineering at a college which has been selected by the Navy Department for the purpose, followed by a special laboratory course in the practical application of micro-wave theory to radiolocating.

The subject of micro-wave technique is indeed fascinating, and its wartime and post-war applications are numerous. Evidence of the tremendous importance of this new field is the fact that forty-three colleges and universities are inaugurating a special course in electronics and microwave theory in an attempt to supply the needs of the armed services and of industry for trained radar engineers. Here is a golden opportunity to get in on the ground floor of a fascinating and tremendously important new field. The Naval Service is urgently in need of a large number of amateurs who can qualify for the service.

Commissions are granted as Ensign E-V (S), or as Lieutenant (jg) if sufficiently well qualified professionally. An Ensign's pay with rental and subsistence is $183 a month and that of a Lieutenant (jg) is $262.67.

All interested and qualified radio amateurs may receive further information, arrange for interviews or secure application blanks by contacting their Naval District Radar Procurement Officer. Merely address your communications to the Commandant of your Naval District at the following mail address:

Commandant, 1st Naval District, North Station Office Bldg., 150 Causeway Street, Boston
3rd — Federal Bldg., 90 Church St., New York
4th — Navy Yard, Philadelphia
5th — Naval Operating Base, Norfolk, Va.
6th — Navy Yard, Charleston, S. C.
7th — Naval Operating Base, Key West, Fla.
8th — Federal Bldg., New Orleans
9th — Naval Training Station, Great Lakes, Ill.
10th — San Juan, P. R.
11th — Naval Station, San Diego, Calif.
12th — Federal Office Bldg., Civic Center, San Francisco
13th — 553 Federal Office Bldg., Seattle, Wash.
14th — Naval Station, Pearl Harbor, T. H.
15th — Naval Station, Balboa, C. Z.

If uncertain of your qualifications, write for advice to ARRL President George W. Bailey, c/o National Research Council, 2101 Constitution Avenue, N. W., Washington.

ELECTRONICS TRAINING GROUP

THAT's the correct name for what we have called the Electronics Battalion of the Signal Corps. College graduates in electrical engineering or physics, particularly those with ham licenses or commercial engineering experience, are wanted to accept commissions in this service. Very special training in micro-wave technique and radiolocator work. Most of the officers go to England for training with the RAF. Reports on their performance are very favorable and some of them have stayed on in responsible positions in England. Normally they return to command units in this country, engaged in this important field. Some men can be accepted who might not wish to go to England, as there is plenty to do now that millions of dollars' worth of locator gear is rolling out of the factories. Full particulars and application forms from George W. Bailey, National Research Council, 2101 Constitution Avenue, N. W., Washington.

NAVY COMMISSIONS FOR ENGINEERING STUDENTS

LAST month we reported that commissions in the Signal Corps are available for junior and senior students of electrical engineering on a basis that permits deferment from active duty until completion of academic work. The Navy is similarly interested in obtaining for radar work the services of members of the junior and senior classes in electrical engineering at accredited colleges and universities.

Members of the junior class selected will be commissioned immediately as ensigns in the Naval Reserve on a probationary basis and will be permitted to continue their studies until the end of the academic year. They may then be called to active duty for the summer months but will be released at the beginning of the next collegiate year to finish schooling. Upon graduation they will be ordered definitely into the service and given post-graduate training at special courses

that have been arranged at Harvard, M.I.T. and Bowdoin College. On the completion of one of these courses, the engineers are given a still further intensive course at the Naval Research Laboratories which will qualify them for expert duty in radar.

Members of the senior class in electrical engineering are eligible for immediate commission as Ensign and will be ordered to duty, for the training outlined above, upon their graduation.

You may get particulars from your dean or from the Radar Procurement Officer of your Naval District.

ENLISTING IN THE SIGNAL CORPS

THE Signal Corps is the only branch of the Army in which, by showing your amateur or commercial radio operator's license to the recruiting officer, you may be assured of assignment to radio work (unless special arrangements have been made in your case). Occasionally a recruiting officer is found who does not understand that he is to accept volunteers in the Signal Corps if they possess an FCC license. Should you encounter such circumstances in your desire to enlist, telegraph a brief report of the facts immediately to George W. Bailey, National Research Council, 2101 Constitution Avenue, Washington, and he can have the matter adjusted at once.

As a matter of fact, ARRL President Bailey is active with almost every matter that concerns the placing of skilled radio people in jobs in the services, both in uniform and as essential civilians. If you have not seen any appeals in this department in which you think you fit, but have had some experience with radio and would like to serve, write to George and ask his advice. He will evaluate your experience and tell you where you can be placed.

CIVILIAN RADIO OPERATORS WANTED

THE Civil Service announces a new examination for radio operators, needed by FCC, Civil Aeronautics, Coast & Geodetic Survey, War Department, etc. — Announcement No. 203. Two pay grades, $1620 and $1800. (Persons already on the eligible register as the result of Announcement No. 93 need not apply.)

Operators are needed to stand regular watches at radio stations and, when required, to be responsible for maintenance. The duties of some may include teletype in addition to code. Applicants must show conclusively that they are able to transmit and receive at not less than 20 words per minute, transmitting by hand or bug. Certain positions are given only to applicants who can also operate a typewriter by touch at 40 w.p.m. minimum, copy messages to typewriter at 20, and operate a teletypewriter at 35. Applicants must be citizens between the ages of 18 and 55, in sound physical health, vision at least 20/20 and 20/30, glasses permitted.

Considering the shortage of persons fully qualified physically, applications are accepted from those who do not meet normal requirements but who can perform a minimum of acceptable service without undue hazard to themselves or others. Such persons, if otherwise eligible, are given temporary appointment for the duration of the emergency.

Ask to see the announcement on Radio Operator, No. 203, at the Civil Service office of any first- or second-class post office, or any district office of the Commission. Applications are being accepted until further notice.

ANTI-AIRCRAFT RADIOMEN

THE Anti-Aircraft Artillery Command for the East Coast is in severe need of radio operators and mechanics. Amateurs who wish to join up voluntarily may make arrangements to get into that service, which is full of intriguing new equipment and which has interesting new interior-communications problems of its own in connection with the operation of AA gear around our coastal cities. We think the chances are better than usual for the promotion of smart amateurs in this service. The East Coast Command alone can use 7000 of us in the next six months.

Those interested should communicate direct with Major P. J. Stevenson (ex-W8DUL), Communications Officer, Anti-Aircraft Artillery Command, Fort Totten, N. Y. We understand that the similar West Coast Command has the same need for amateurs and that its Communications Officer may be addressed at the Presidio of San Francisco.

TRAINEE-REPAIRMAN, NEW ENGLAND

TO TRAIN personnel to fill certain civilian vacancies, the Signal Corps will give advanced training as radio repairman and telephone repairman for a six months' period, *with pay*, to both male and female applicants between the ages of 16 and 50. Civil Service jobs, $1440 per year. Applications must be filed *not later than April 13th*. Personal appearance and written test required. (The written aptitude test consists of

ATTENTION, SOLDIERS AND SAILORS!

We urge you to write to the editor of *QST* if you know of any competent radio amateur in the armed forces who is assigned to duties which have no connection with radio. Many have already written to us, and we are glad to say that as a result a number have been reassigned to duties involving radio.

problems in spatial relations, arithmetic and simple mechanics.) Details in Civil Service Announcement No. 1–90, at your post office.

This is something new — pay while learning. As employees of the Signal Corps, accepted applicants will receive six months' instruction in overhaul, maintenance, repair and inspection of Army communications equipment. The training will be at an Army school. On successful completion, trainees will be eligible to the position of Junior Repairman, Signal Corps Equipment, at $1620 a year; with subsequent advancement dependent upon ability.

Applicant must within ten years have had an amateur or higher-grade license for at least two consecutive years and have built his own receiver and transmitter; or have had at least six months' paid experience in some branch of technical radio work; or have successfully completed certain electrical schooling specified in detail in the announcement. One such accepted item is the completion of the ESMDT radio course which includes maintenance and repair.

Many examination points throughout New England. See announcement at your post office.

ARMY AND NAVY ENLISTMENTS

MAYBE you think the Navy doesn't need radio technicians and operators! You've seen the solicitation of amateurs for radar maintenance men, for which special schools have been set up. Well, the Navy wants 8000 of them this year and offers a rating as radioman second class, four notches above the usual enlistment rate. The Navy schools that turn out operators (RM3C) have a quota this year of 900 a month, 10,000 for the year. And for next year they must create 1900 a month, or 23,000 for the year! Yes, the need is great.

And the Signal Corps, despite its several large schools, figures that up until summer of next year it will need 9000 more operators and mechanics than its schools can turn out, and it wants to get that many trained volunteers.

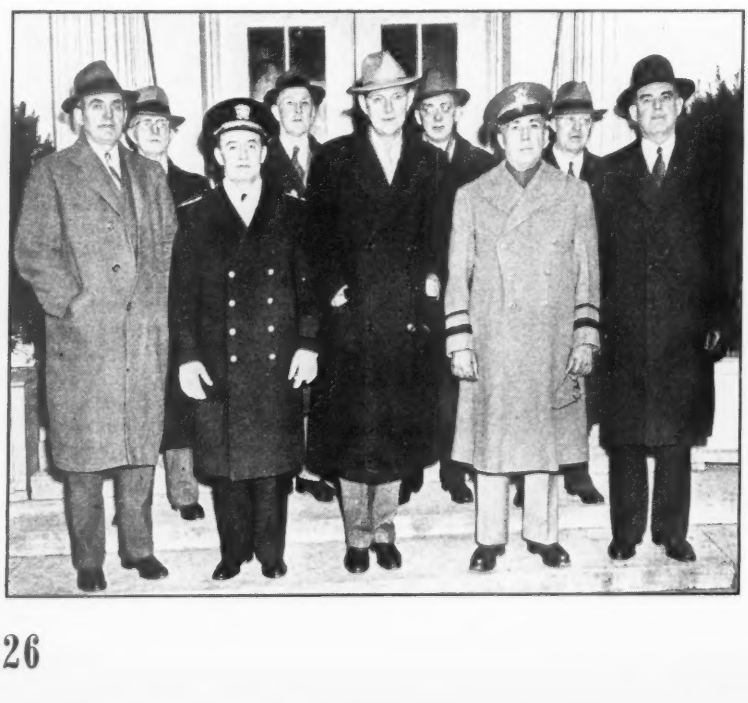
For particulars on these opportunities, take your ham ticket and go see the nearest recruiting officer.

CIVILIAN RADAR EXPERTS

THE Bureau of Ships of the Navy Department needs a few good men in civilian capacities, under the Civil Service, to handle technical details in connection with the radiolocator. The positions are administrative and involve some design work. Salaries will depend on the age and experience of the applicant.

These men must have a background of electrical engineering or physics, with knowledge of electronics and radio. Some experience in the field of radio is absolutely essential and an amateur license is particularly desirable. Engineering degree not entirely necessary, although college-trained men are preferred.

Write, giving particulars on your qualifications, to G. W. Bailey, National Research Council, Washington.



Committee of honorary members of the VWOA which presented President Roosevelt with the association's gold Marconi Medal of Honor (see opposite page). *Left to right:* Neville Miller, president, National Association of Broadcasters; W. D. Terrell, chief of FCC's Field Division and veteran radio administrator; Rear Admiral Leigh Noyes, Director of Naval Communications; F. P. Guthrie, chairman of Washington chapter of VWOA, district manager for RCA Communications; Hon. James Lawrence Fly, chairman of FCC and DCB; Lieutenant Commander E. M. Webster, assistant chief engineer of FCC, Major General Dawson Olmstead, Chief Signal Officer of the Army; E. H. Rietzke, president of Capitol Radio Engineering Institute; George W. Bailey, W1KH, president, ARRL.

V.W.O.A. Honors Amateur Radio

Marconi Memorial Service Medal Awarded at Annual Dinner-Cruise

ALONG with the Pan-American Union, three heroic marine operators and Code Champion Ted McElroy, the Veteran Wireless Operators Association, at its seventeenth annual dinner-cruise at the Hotel Astor in New York on February 21st, honored the thousands of radio amateurs now serving their country in the armed forces.

A special Marconi Medal of Service was presented to ARRL President George W. Bailey, as the representative of the nation's hams. In making the presentation during ceremonies broadcast over the NBC network, William J. McGonigle, president of the VWOA, asserted that the amateurs, like their professional brethren, could always be depended upon in time of need, and outlined their record of performance thus far in the war emergency.

The principal VWOA annual award — the Marconi Memorial Service Award — this year was given to the Pan American Union as the representative of all the South and Central American Republics. VWOA President McGonigle read a message from Assistant Secretary of State Sumner Welles, acknowledging the award. Dr. Leo S. Rowe, Director-General of the Union, accepted the handsome plaque with the assurance that it would be accorded a place of honor in the Pan-American Building in Washington. Medallions bearing replicas of the theme of the award were given each of the presidents of the neighboring republics.

Marconi Memorial Scrolls of Honor were given to Robert Leslie Thorp, heroic English radio officer of the torpedoed freighter *San Gil*, who repaired his antenna in the face of enemy gunfire and sent blind SOS's that resulted in rescue; to Jack Berenbaum, W2MDL, youthful radio officer of the tanker *Malay*, who maintained a heroic 15-hour watch following the shelling and torpedoing of his ship (his first commercial assignment!); and to U. S. Army Staff Sgt. Joseph Larue Lockard, the soldier mentioned in the famous Roberts' report as having, on his own time, in an effort to increase his skill in the use of the radiolocator, detected the approach of Japanese planes off Hawaii on December 7, 1941.

As yet another recognition of his outstanding code prowess, World's Champion Radiotelegrapher Ted McElroy was given a Marconi Memorial Award for Code Proficiency. During the broadcast ceremony, Mac demonstrated his ability at making typewriter copy at the world's championship speed of 77 w.p.m., the scurrying code oscillator and the clicking typewriter going out on the air simultaneously.

All the recipients of awards were present to receive them in person, with the sole exception of Sergeant Lockard. Bill McGonigle made the presentation in each case, and also introduced the other distinguished guests of the evening, among them many a figure high in radio circles.

The Marconi Memorial Scholarship in radio and electrical communication, awarded annually, this year went to Richard Nebel, W2DBQ, who in 1941 had been awarded a Memorial Scroll by the Association. The formal presentation of this scholarship was made by E. H. Reitzke, president of the Capitol Radio Engineering Institute, where Dick will receive his training.

Although an occasion devoted to the professional radiomen, the amateurs were certainly not out of place. Not only was one of the principal awards given to the amateur fraternity as a body, not only were there many well-known hams among the members and guests, but two of the individual awards went to hams. Jack Berenbaum, we learned, entered radio as an amateur three years ago, and got his commercial ticket only last summer. The *Malay* was his first ship, but he was no whit daunted by his experience; instead, he was waiting impatiently to put to sea again as soon as the vessel could be repaired. Dick Nebel, W2DBQ, is, of course, well known to the entire amateur fraternity as ARRL EC for Brooklyn, AARS Radio Aide, etc.

If there is any field in which professional and amateur alike share mutual affection and respect, it is radio. The VWOA has shown what it thinks of the hams, and we for our part salute the professional operators — officers and gentlemen all.

—···—

Another VWOA activity of interest to ARRL members was the presentation of a special gold Medal of Honor to President Roosevelt as a pioneer and patron of radio, commemorating his sixtieth birthday. In accepting the medal the President, in an informal quarter-hour's conversation, recalled several interesting experiences he had had in naval communications as assistant secretary of the Navy. The presentation party was organized by ARRL President George W. Bailey, at the request of Wm. McGonigle, president of the VWOA, who was himself unfortunately unable to be present. A photograph of the presentation committee appears on the opposite page.

— *C. B. D.*

The Field That Stays At Home

Fundamental Principles and Practice of $\lambda/2\pi$

BY CLINTON B. DE SOTO,* WICBD

"The induction field is the field that stays at home." — Prof. R. R. Ramsey.

EVERY time you threw the transmitting switch in pre-war days and sent power surging up into your antenna, two quite distinct electromagnetic fields were set up around it. One of these was the *radiation* field, the energy in which left the conductor and travelled off into space. The other was the *induction* field; its energy did not go off into space, but instead returned each time to the parent conductor.

Simply because its energy does travel off into space (and perchance into the intent eavesdropping ears of erstwhile J's, D's, etc.), the radiation field is no longer available for your use. But the once-forgotten induction field, which sends its energy only a little way and then yanks it back again like a yo-yo ball, now offers an interesting field (resemblance to pun purely coincidental!) for experimentation.

Older Than Radio

Even before Maxwell's theory of radiation had been reduced to practice, experimental communication was carried on by means of electrostatic and electromagnetic induction. As early as 1865, Dr. Mahlon Loomis signalled between two mountain tops eighteen miles apart by its use. In the latter 19th century many of the world's greatest scientific minds experimented with inductive effects over distances of a mile or more — Thomas A. Edison, Alexander Graham Bell, Oliver Lodge, A. W. Heaviside and many others.

But with Hertz' demonstration of radiation as a practical phenomenon, the remote induction field came to have little more practical importance in communications than as a source of annoyance to telephone and telegraph men running into cross-talk from parallel wire lines.

Until 1938, that is. In that year Philco engineers, seeking a remote-control tuning system without the inconvenient multi-wire cables and accompanying complexities, evolved the idea of using an inductively coupled r.f. transformer with its primary and secondary spaced as much as 75 feet. The primary of this transformer was supplied from a small battery-powered oscillator, and the voltage induced in the secondary fed a supplementary amplifier in the b.c. set.

Naturally, because of its resemblance to a conventional transmitter and receiver, questions arose concerning the legality of the device. After considerable debate pro and con and a hearing or two, the FCC finally handed down rules covering the subject. For the record, those rules are reproduced here in their entirety:

PROVISIONS GOVERNING THE OPERATION OF LOW POWER RADIO FREQUENCY DEVICES

2.101. *General.* Pending the acquiring of more complete information regarding the character and effects of the radiation involved, the following provisions shall govern the operation of the low power radio frequency electrical devices hereinafter described.

2.102. *Apparatus excepted from requirements of other rules.* With respect to any apparatus which generates a radio frequency electromagnetic field functionally utilizing a small part of such field in the operation of associated apparatus not physically connected thereto and a distance not greater than $\frac{157{,}000}{f_{kc.}}$ ft. $\left[\lambda/2\pi\right]$, the existing rules and regulations of the Commission shall not be applicable provided:

(a) That such apparatus shall be operated with the minimum power possible to accomplish the desired purpose.

(b) That the best engineering principles shall be utilized in the generation of radio frequency currents so as to guard against interference to established radio services, particularly on the fundamental and harmonic frequencies.

(c) That in any event the total electromagnetic field produced at any point at a distance of $\frac{157{,}000}{f_{kc.}}$ ft. $\left[\lambda/2\pi\right]$ from the apparatus shall not exceed 15 microvolts per meter.

(d) That the apparatus shall conform to such engineering standards as may from time to time be promulgated by the Commission.

2.103. *Exceptions; interference to radio reception.* The provisions of sections 2.101 and 2.102 shall not be construed to apply to any apparatus which causes interference to radio reception.

2.104. *Inspection and test; certificates.* Upon request, the Commission will inspect and test any apparatus described in sections 2.101 and 2.102, and on the basis of such inspection and test, formulate and publish findings as to whether such apparatus does or does not comply with the above conditions, and issue a certificate specifying conditions of operation to the party making such request.

And so we have the regulatory justification for all such miscellaneous gadgets as the "Mystery Control," wireless phonograph record players, phantom volume controls in p.a. systems and the like. We have also an interesting field for interim experimentation in connection with limited-range communication and remote control devices.

The purpose of this article is not so much to suggest the possibilities, however, as to underline the fundamental principles and to provide a compilation of circuit and design data.

* Assistant Editor, *QST*.

How Radiation and Induction Fields Are Created

It may help in understanding the distinction between the two kinds of fields to review the phenomenon of radiation, as far as that can be reduced to simple, non-mathematical concepts. First of all, consider a simple coil with d.c. flowing through it. A magnetic field is set up around the coil, extending into space for a certain distance with a strength depending on the magnitude of the current. This field has a certain polarity, depending on the direction of current flow.

Now suppose the current is instantaneously cut off. The field collapses and the energy in it returns to the coil. But if, the very instant the current stops flowing in one direction, it starts flowing again in the opposite direction with equal magnitude, an equal and opposite electric field will be set up before the original field can return to the coil. Unable to return home because the new field has forced it out, the original field sets forth on a journey through space.

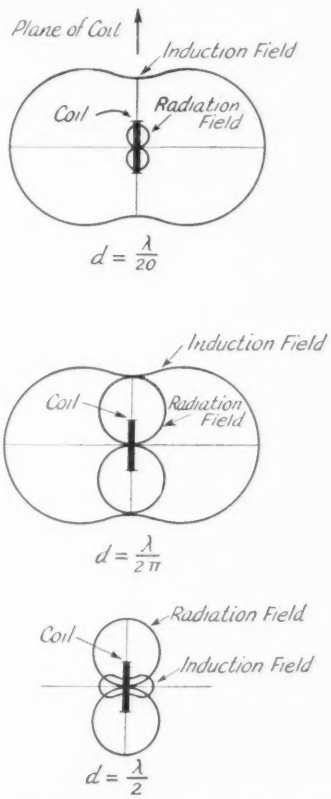


Fig. 1 — The relationship between induction and radiation fields about a coil or loop antenna at various distances. Below each diagram the distance in terms of wavelength is indicated. At a point very near the coil $\left(\frac{\lambda}{20}\right)$ the induction field strongly predominates. At the distance $\frac{\lambda}{2\pi}$ (center) the two are equal in the plane of the loop. When the distance is a full half-wave (bottom) the radiation field is the stronger.

That constitutes radiation — the successive detachment of one electrical field after another in a series of waves as each is succeeded by another with each reversal of current. In an ideal system with instantaneous reversals, all of the energy in each field would be radiated, and none would return to the coil. In actuality, each succeeding cycle from the a.c. generator feeding the coil represents a slow rise and fall of potential. This gradual building up to peak amplitude and corresponding gradual decay allows time for some of the energy to return to the coil before the new field becomes strong enough to send it away. The slower the rise and fall — i.e., the lower the frequency — the more of the initial energy returns to the coil. Thus at audio or very low r.f. most of the energy succeeds in returning and very little is radiated. At the higher radio frequencies, on the other hand, the cycles come along so fast that the electric field — even though it travels 186,000 miles per second — has little time in which to go out and return, and as a result most of it gets detached and is radiated into space.

The part of the field that returns to the coil is the induction field, while the part that is detached is called the radiation field.

The most obvious difference between the radiation and the induction fields is that the radiation field is the weaker near the antenna and the stronger at a distance. This is illustrated in Fig. 1, based on studies made by Professor Ramsey, which shows the relative strength of the two fields at various relative distances identified in terms of the operating wavelength. Specifically, the radiation field varies inversely as the distance, while the induction field from a coil varies inversely as the *cube* of the distance. The two fields are always equal at a distance equal to the velocity of light divided by the angular velocity.

This expression will be recognized as that used in the FCC rule to state the maximum distance at which the measured field may not exceed 15 μv. per meter, to ensure that no interference is caused radio services. Actually, since the two fields are in time quadrature this measured value represents 1.414 times the true value of either field alone, but as far as the receiving antenna or coil is concerned it has no social prejudices and responds to both fields as one.

Thus we have our first design rule — the measured field strength at the distance

$$\frac{\lambda}{2\pi} \text{ meters or } \frac{157{,}000}{f_{kc.}} \text{ ft. or } \frac{30}{f_{kc.}} \text{ miles} \qquad (1)$$

must not exceed 15 μv. per meter. This distance, expressed in feet, is shown in Fig. 2 for frequencies throughout the region normally used for the purpose.

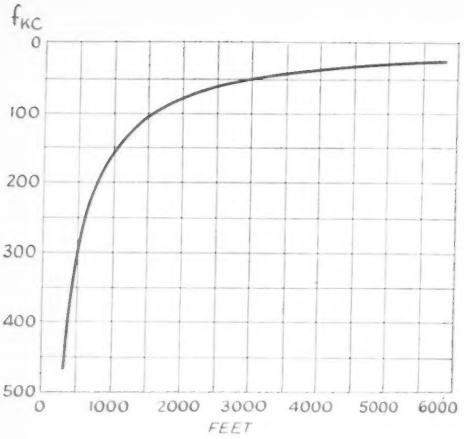


Fig. 2 — Maximum distances in feet at which 15 μv.-per-meter field strength is permitted under FCC Rule 2.102 for various frequencies.

Calculating Field Strength

The question then arises — how to determine that the field strength at the maximum distance does not exceed the legal limit of 15 μv. per meter? Few amateurs have access to standard signal generators and the rest of the equipment that would be necessary to do the job properly.

However, it is possible to compute the induction field using nothing more than an antenna ammeter of the thermocouple or hot-wire variety and a little care. Knowing the current in and the physical characteristics of the transmitting coil, the field strength at any distance can be worked out by the following formula:

$$E = \frac{18.85\ N\ r^2}{d^3} I \qquad (2)$$

where E = field strength at the receiving coil in microvolts per meter;
N = number of turns in transmitting coil;
r = radius of transmitting coil in centimeters;
I = current through the transmitting loop in milliamperes; and
d = distance between centers of the transmitting and receiving loops in meters.

This can be stated to give the current required in a given loop to produce the maximum permissible field at any wavelength:

$$I = 0.0032 \frac{\lambda^3}{N\ r^2} \qquad (3)$$

where λ equals the operating wavelength and the other values are the same as in (2).

The physical dimensions of the transmitting coil or primary are not of particular importance if rated current is obtained. The important thing is that both dimensional and electrical measurements be accurately made, and that enough power be available from the oscillator to cause rated current (or slightly less, for a margin of safety) to flow in the coil.

If the current is held at the calculated value, the induction field remains constant regardless of frequency. Unlike the radiation from a coil or antenna, which varies with frequency, the induction field is independent of frequency. In fact, the strength of the induction field is a function solely of the current, the area of the coil, the number of turns and the distance.

The Transmitter

Almost any simple oscillator circuit can be used in the transmitter. Ordinarily not more than 2 or 3 watts input will be required, unless a loop of very few turns and small area is used. One suitable transmitter design was described on page 42 of March, 1942, *QST*.

Fig. 3 shows an even simpler circuit, suitable for use on c.w. or for sending remote-control pulses. It can also be modulated to perhaps 50% (another 6J5 as modulator would do the job) for voice work. The coupling tap is adjusted to give the calculated current as determined from (2). If more power is required, a 6V6 with No. 2 grid tied to plate may be substituted for the 6J5.

The circuit of the Philco "Mystery Control" battery-operated portable control unit is shown in Fig. 4. Used between 350–400 kc., the type 30 tube with 45-volts on the plate gives 130 milliamperes of r.f. current in the 675-mh. coil (122 mw. power, Q of 216).

The oscillator power transformer should preferably have an electrostatic shield between primary and secondary. Transformerless supplies are not advisable for this application because of the excellent possibility of increased radiation. R.f. line filters in the 115-volt leads will help to limit radiation.

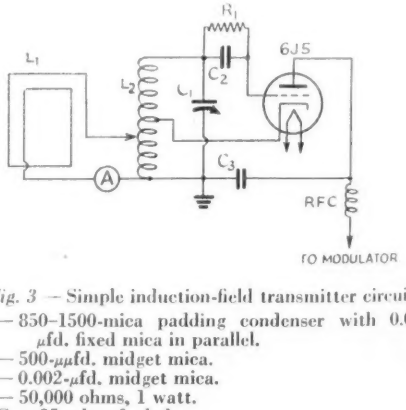


Fig. 3 — Simple induction-field transmitter circuit.
C1 — 850–1500-mica padding condenser with 0.005-μfd. fixed mica in parallel.
C2 — 500-μμfd. midget mica.
C3 — 0.002-μfd. midget mica.
R1 — 50,000 ohms, 1 watt.
RFC — 25-mh. r.f. choke.
L1 — 20 turns No. 12 antenna wire, 18-in. dia., spaced diameter of wire.
L2 — Coil to tune to frequency in use. For 50–60 kc.: 150 turns No. 22 e., close-wound on 4-in. dia.

In this connection, it is interesting to note that the power wiring, etc., is much more likely to create interference to other radio services by radiation than the emanations from the transmitting loop alone. The efficiency of the coil as a radiator is very poor compared with almost any straight-wire antenna, such as a power line. This is particularly true when the receiver being interfered with is equipped with an antenna rather than a loop.

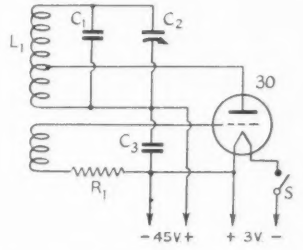


Fig. 4 — Circuit of the Philco control unit.

C_1 — 200 $\mu\mu$fd.
C_2 — Mica trimmer.
C_3 — 0.05 μfd.
R_1 — 500 ohms.
L_1 — 53 turns, 6¼-in. diameter.
S — Filament switch (on pulsing device; used to key oscillator).

The Receiving Coil

So much for the transmitter. Let's talk about the receiving coil or the secondary of the inductive transformer now. Assuming the loop is located in a known field, the following rules apply:

The voltage induced in the coil is directly proportional to the area of the loop (frequency and number of turns remaining constant).

It is directly proportional to frequency (turns and area constant).

It is directly proportional to the number of turns (frequency and area constant).

From the above, it can readily be shown that the induced voltage is proportional to the inductance of the coil.

Disregarding strays, the inductance increases as the square of the turns ratio, the area remaining constant. Conversely, the inductance increases as the square of the radius, the number of turns being constant.

All this leads to the conclusion that with a given inductance the induced voltage will be greater the larger the area of the coil. In practice other considerations enter, but the rule holds in general. For maximum sensitivity, therefore, every effort should be made to make the area of the coil as great as possible, and to keep the inductance as high as possible and the capacity — both tuning and distributed — low.

Since the induction-field system is, after all, nothing more than an air-core r.f. transformer — even though the primary and secondary may be spaced thousands of feet — it is quite possible to compute the field induced in the secondary coil at any distance provided only the dimensions of the coils and the current in the primary are known:

$$E_I = \frac{124\times10^{-9}\, I\, f\, r_1^2\, r_2^2\, N_1\, N_2}{d^3} \qquad (4)$$

where E_I is the voltage induced in the receiving loop, I the current in the transmitting coil in milliamperes, f the operating frequency in kc., r_1 and r_2 the radii in centimeters of the transmitting and receiving loops respectively, N_1 and N_2 the number of turns in the respective loops, and d the distance in meters between them.

The effective signal at the grid of the first amplifier tube when the receiving loop is at the distance $\lambda/2\pi$ (coils co-planar) in a 15-μv. field can be computed roughly by the following simple relationship:

$$E_G = \frac{0.0296\, r^2\, N\, Q}{\lambda} \qquad (5)$$

where E_G is the grid input voltage, r the radius of the receiving loop and N the number of turns. Q refers to the tuned circuit, and can be considered as that of the receiving loop.

The Q of the coil must be made as high as possible, since the voltage applied to the grid of the first amplifier tube in the receiver will be equal to the induced voltage times the Q of the tuned circuit. This is determined by a number of factors, including wire size, shape and insulation. At the frequencies normally used Litz wire would be desirable, but unfortunately it is not now readily available. Any available solid wire between No. 24 and 30 will result in a satisfactory coil. Smaller wire than No. 32 or larger than No. 20 is not recommended for these frequencies.

The large diameter required in coils of this type makes it impossible to use the form factor normally considered best at the frequencies in use. However, by using single-layer windings, spacing the wire slightly or using double-cotton-covered wire, and keeping the insulating or supporting material in the coil to a minimum, a coil of good Q can be made.

Calculating Inductance of Loops

The inductance of large-diameter coils is difficult to calculate exactly, but it can be worked out with fair accuracy by using Nagaoka's formula:

$$L_{\mu h} = \frac{0.0395\, r^2\, N^2}{b}\, K \qquad (6)$$

where r is the radius in cm., N the number of turns, b the winding length of the coil in cm. and K a constant obtained from Fig. 5.

This formula is accurate only for single-layer solenoid coils, but approximations sufficiently close for ordinary work (there'll be some trimming and paring anyway) can be made by taking

the periphery of coils of other shapes and dividing by 2π to obtain r. Thus a square loop 30 inches on a side, an equilateral triangle with 40-in. legs

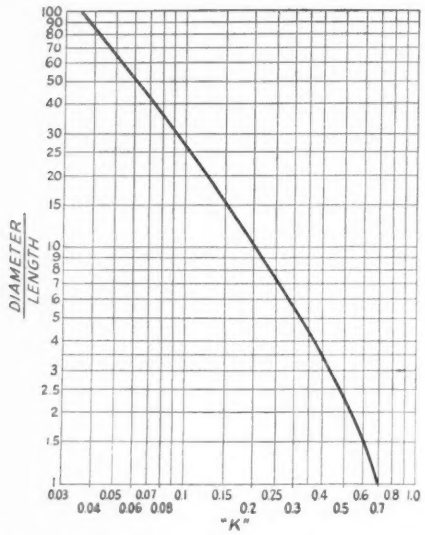


Fig. 5 — Constant K used in calculating inductance of loops using formula in text, based on the ratio of diameter to length of winding.

or a circle with a circumference of 120 inches all have the same value of r — 19.1 inches.

In the case of spiral coils (as in Fig. 6), for r use the mean radius — i.e., one-half of the *inside* diameter plus b.

Fig. 6 shows two satisfactory methods of loop construction. For the higher frequencies large cardboard containers, such as oatmeal boxes, make suitable forms. Self-supporting basket-weave coils can be made with heavy wire by arranging wooden pegs in a circle and interwinding a solenoid coil around them in similar fashion to the "spider-web" spiral winding of Fig. 6 — (A).

The Receiver

Undoubtedly the toughest problem in setting up an induction-field system is the receiver, at least if you aren't going to be satisfied with anything less than a completely independent unit. It takes a good bit of gain to build 15 microvolts (more or less) into a usable signal, and gain means stages and tubes — and sometimes trouble. It's a good idea, too, to keep the selectivity of the amplifier high, because reduced bandwidth means reduced noise, and the ultimate limit in the useful range is determined by the equivalent side-band noise input ratio.

The best system without doubt is the use of a low-frequency converter and your present communications receiver. The unit described by Goodman in the March issue, beginning on page 15, can be applied to the present problem. The tuned circuits must, of course, be modified to fit the chosen operating frequency, but that isn't much of a job, particularly since most induction-field work will be more or less fixed-tune, anyway, and there won't be any tracking problem. An r.f. stage might be desirable to improve the signal-to-noise ratio if work is to be done at the extreme limit of the useful range, but all in all the complication hardly seems worthwhile.

If a receiver is built especially for the job it logically becomes a straightforward r.f. amplifier, with two or three stages depending on the frequency and required sensitivity, each stage individually tuned. In designing such a receiver three quantities should be known — input signal voltage, E_I, gain per stage, and required voltage out of the detector, E_O. Divide E_O by E_I to get the overall gain required, and then in turn divide that figure by the stage gain to arrive at the number of stages needed.

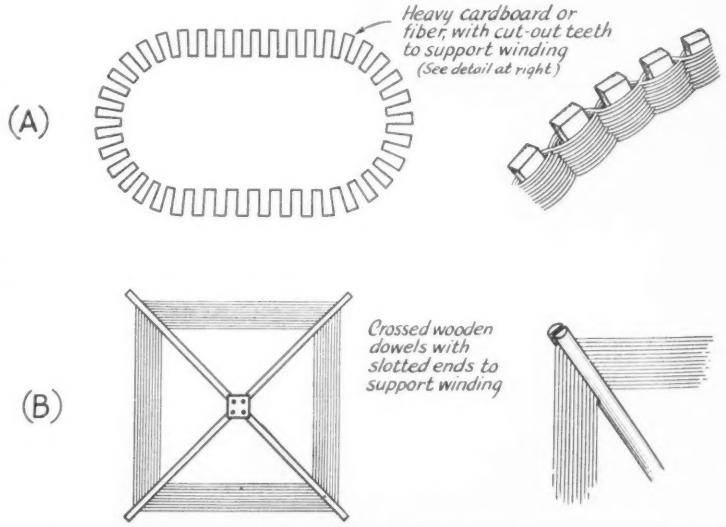


Fig. 6 — Typical methods of constructing small loops. The construction at (A) results in a particularly strong and efficient coil if rigid, non-warping material is used as a base. Heavy electrical fibre board or light Masonite are satisfactory. A form using crossed dowels, as at (B), is easier to make but somewhat more difficult to wind smoothly. Equal tension must be maintained on all sides. The dowels should be slotted just the width of the wire, to cause the turns to pile up properly. In either type, d.c.c. wire is advised in winding. The form and winding should be thoroughly dried and impregnated with coil dope (shellac may be used, if nothing better is available).

I.f. transformers constitute logical interstage coupling devices. Standard replacement transformers are available for frequencies such as 125, 175, 262, 375, 455 kc., etc.; consult a service-man's manual for types and sources.

Those who have ancient b.c.l. superheterodynes or parts therefrom kicking around, or who have access to such sets in local radio graveyards, may find themselves all set up with a gold mine. The old low-frequency i.f. transformers — standard i.f.'s in the '20's ranged from 30 to 115 kc. — should work well in this job.

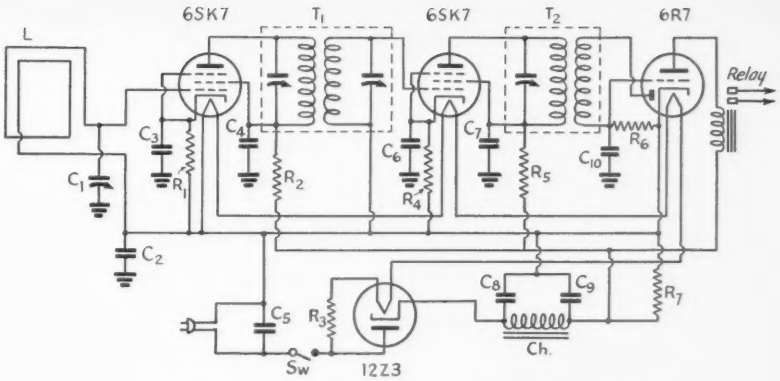


Fig. 7 — 150–200-kc. induction receiver for remote control.

C_1 — 25–100-$\mu\mu$fd. mica trimmer.
C_2 — 0.25 μfd., 200 volts.
C_3, C_4, C_6, C_7, C_{10} — 0.1 μfd., 200 volts.
C_5 — 0.05 μfd., 400 volts.
C_8, C_9 — Dual 16-μfd., 200-volt electrolytic.
R_1, R_4 — 300 ohms, ½-watt.
R_2, R_5 — 2000 ohms, ½-watt.
R_3 — 285 ohms, 50-watt (may be line-cord resistor).
R_6 — 0.5 megohm, ½-watt.
R_7 — 50,000 ohms, 1-watt.
L — 100 turns No. 28 d.c.c., 18-in. diameter.
T_1 — 175-kc. interstage transformer (Sickles 700).
T_2 — 175-kc. diode transformer (Sickles 803).
Ch — 10-henry, 40-ma. filter choke.
Relay — 10 ma.

Fig. 7 shows the circuit of a receiver built around a set of small 175-kc. u.f. transformers and used in the 150–200-kc. band. It was made originally for remote-control purposes, and therefore ends in a carrier-operated relay tube. When a signal is received the diode biases the grid of the 6R7 triode, reducing the plate current and releasing the relay contacts. For communication work the triode could be connected as an ordinary audio amplifier, by the addition of a 0.01-μfd. coupling condenser and 1-megohm grid resistor. A transformerless power supply is used.

Even at 150 kc. the useful range is only a fraction of a mile, and therefore it is the lower frequencies that look most attractive for induction-field work. If no transformers suitable for those frequencies are available, tuned impedance coupling can be used as shown in Fig. 8. Ordinary lattice-wound r.f. chokes may be used as coils.

With this type of circuit the gain per stage is approximately:

$$\frac{E_o}{E_I} = 6.28\, G_m f\, L\, Q \qquad (7)$$

where G_m is the amplifier tube transconductance in mhos, f is the operating frequency in kc., L

(*Continued on page 66*)

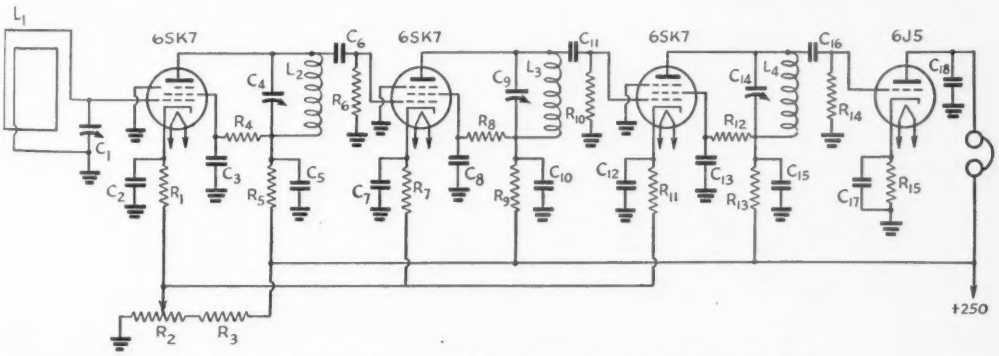


Fig. 8 — Induction receiver for 50–60 kc., using tuned impedance coupling.

C_1, C_4, C_9, C_{14} — 25–100-$\mu\mu$fd. mica trimmers.
C_2, C_7, C_{12} — 0.25 μfd., 200-volt.
C_3, C_5, C_8, C_{10}, C_{13}, C_{15} — 0.1 μfd., 400-volt.
C_6, C_{11}, C_{16} — 500-$\mu\mu$fd. mica.
C_{17} — 0.5 μfd., 200-volt.
C_{18} — 0.001-μfd. mica.
R_1, R_7 — 500 ohms, ½-watt.
R_2 — 5000-ohm variable, wire-wound.
R_3 — 40,000 ohms, 2-watt.
R_4, R_8, R_{12} — 60,000 ohms, ½-watt.
R_5, R_9, R_{13} — 2000 ohms, ½-watt.
R_6, R_{10}, R_{14} — 5 megohm, ½-watt.
R_{11} — 1000 ohms, ½-watt.
R_{15} — 50,000 ohms, ½-watt.
L_1 — 150 turns No. 30 d.c.c. wound in square loop, 45 inches on side.
L_2, L_3, L_4 — 125-millihenry shielded r.f. chokes.

Vocational Training in the Navy

We've just spent an interesting hour reading a fat pile of literature on the opportunities for vocational training in the Navy and incidentally gaining a little insight into the remarkable relations the Navy has with the educational system of the country in general.

Men who enlist in the U. S. Navy are given every opportunity to learn useful trades and arts. As a matter of fact, we have been tremendously impressed by the vast array of schools and courses which the Navy maintains for the schooling of its men. There are courses running from a few weeks to something of the order of a year in scores of different subjects — schools for enlisted men, for officers and even for reserve midshipmen. Courses in navigation, seamanship and ordnance; pilot training and radio engineering for both officers and enlisted men; and, for the latter, a variety of specialist schools that would put your eye out. Some of the specialist schools that we noticed dealt with aerography, rigid airships, hydraulic control, electricity and radio matériel, internal communication, fire control, optics, aviation mechanics, automatic pilots, bomb sights, Diesel engines, photography, gyro compasses, torpedoes, underwater sound, carpentry, metalsmithing and stexography. (We still don't know what a stexographer does!) It's interesting to read the syllabuses for some of those courses and see the hundreds of hours of classroom lectures and of laboratory and shop work and the provisions made for the Navy equivalent of home study. One cannot escape the feeling that here is an unparalleled opportunity to really buckle down and learn the complexities of a valuable art.

Composing a message in the flag code. Each of the vari-colored flags in the flag-locker at the left has a different significance. Strung on a halyard and hoisted aloft they constitute a complete letter of instructions to other units of the fleet. Official U. S. Navy photograph.

Consider for example the syllabus of the radio engineering course, which lasts 20 weeks: Receivers, 40 hours; motor starters, 20 hours; radio physics, 20; detectors, modulation, audio systems, 40 hours; keying and biasing, 20; transmitters, 20; more receivers, another 20; power oscillators, aircraft radio, 40; sound, 15; antennas and transmission lines, 20; direction finders, 15; instruction in secret radio installations, 90. The total with lab work is 420 hours, of such concentrated value that the Navy urges colleges to grant those who complete it a full year of academic credit.

When new men in the Navy complete their recruit training, they may aspire to the rating of electrician's mate, fire controlman, gunner's mate, torpedoman, aviation ordnanceman, aviation machinist's mate, aviation metalsmith, radioman, aviation radioman, pharmacist's mate, signalman, quartermaster, yeoman, storekeeper, machinist's mate, shipfitter, metalsmith, boilermaker, molder, carpenter's mate, or patternmaker. Much, of course, depends upon the man himself, but the Navy needs trained men and maintains many trade schools to qualify them for these ratings. The courses are short but comprehensive, planned to give the student a foundation on which he may become a finished artisan by his practical experience in the fleet — which service is what really develops skilled personnel. Selection for the schools is based upon adaptability to learn and therefore previous experience is not required.

In these vocational schools the emphasis is put on the actual apparatus used on shipboard, so the courses deal with the practical aspects of the matter much more than they do its theory. For example, the greater part of the training of metalworkers and woodworkers consists of practical work performed in the various shops, the work being grouped around projects so designed as to teach the essentials of the trade beginning with simple operations and progressing to the more complicated. The ordnancemen are instructed in ammunition and explosives, torpedo and gun-control equipment, range finders, gun construction, fire control instruments, with actual work on the torpedos, guns and small arms. The curriculum of the electrical course includes the usual elements of electricity and then gets right down to wire calculation, the principles of armature winding, blueprint reading, and actual work on meters,

switchboards, ground detectors, searchlights, gun wiring and other features of the electrician's trade in the Navy. The quartermaster students learn piloting, how to read charts, gyro compass adjustment, and so on. The communication schools deal with many things beside radio: semaphore, blinker, flag hoists, etc.

The men who go in for radio training get theory and practice as well as code. All radio operators must be proficient in touch typewriting, so the Navy starts them off on code and typing simultaneously right from scratch. Naval communication procedure and theory are alternated with them. The students also copy the regular Navy broadcast schedules, and wind up with a course in practical operating.

The Navy Department has received many requests from high schools and preparatory schools on how they can best train their youths for service in the Navy. The Navy responds that one of its greatest obstacles to training its men in the more technical fields is the lack of certain essentials in basic schooling, and it has therefore urged the secondary schools of the country to see that their young men get an adequate background of mathematics and science and to introduce as much additional instruction in other useful directions as necessary. This is a war of techniques and the young man who can get an adequate basic schooling will be able to serve his country much better than one who rushes into service unprepared. Secondary schooling should contain at least two and one-half years of mathematics to include algebra, plane and solid geometry and trigonometry. The Navy also suggests instruction in Morse code, in elementary radio and telephone communication and navigation, in physics and chemistry, and vocational training in machine-shop work, foundry work and internal combustion engines. To aid the high schools in establishing radio courses, the Navy has distributed through the state commissioners of education an outline for a suggested course involving about 80 hours of classroom lectures plus laboratory and shop work.

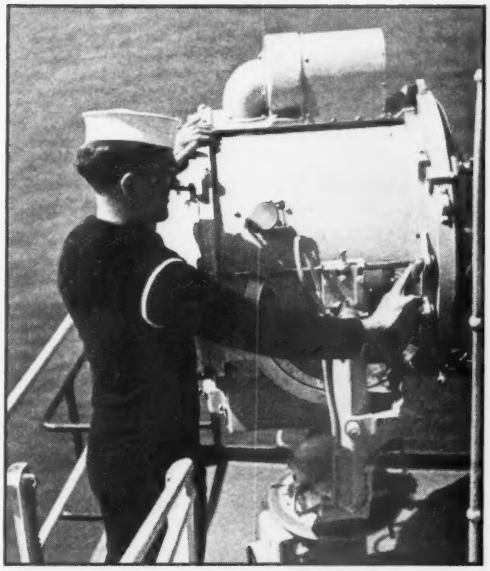
We are ourself greatly impressed with the value of the training the Navy makes available for its men. We therefore have been particularly pleased to learn that the Navy has supplied the colleges of the country with detailed information on the amount of work done in these training courses and suggestions on just what college credits should be allowed for the successful completion of each course and even for the subsequent promotion that a Navy man receives in recognition of his increased value. It will be good news to the boys who have left college to go into the service that dear old alma mater will be very likely to give them husky allowances for the schooling that they undergo in service.

This Is Your Opportunity

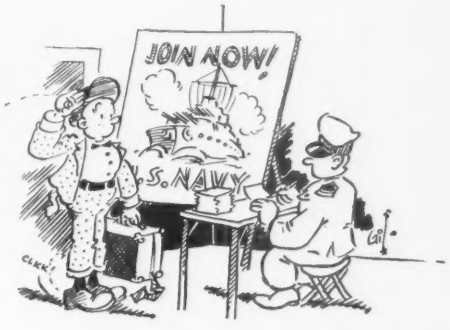
We've given this description of some of the Navy's technical schooling because radio amateurs are technical people, interested in all manner of technical things. With the nation needing the services of every available man, those who have skills in the difficult arts are particularly keenly sought and will doubtless prefer to serve in the fields in which they have experience. But whether or not radio is your preference, Navy training offers you an admirable opportunity to receive valuable instruction — for which you'd otherwise be paying out some very nice tuition fees. In this brief article we've only been able to hit a few high spots, but if the opportunity for Navy schooling interests you, you can obtain more particulars from the nearest Navy recruiting station, with one in every city of size.

And now to find out what stexography is. Wonder if the Navy spelled that word correctly. . . .

K. B. W.



The Navy has many interesting types of communication apparatus, even for its routine jobs. Here a seaman aboard a naval vessel is signalling with a huge searchlight. Official U. S. Navy photograph.



ON THE ULTRA HIGHS

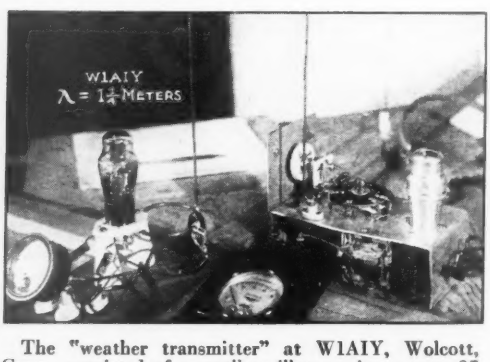
CONDUCTED BY E. P. TILTON,* W1HDQ

PROBABLY the most fascinating angle in working skip DX on Five was the possibility that there might be some sort of rhyme or reason to the occurrence of this phenomenon. Just about everyone who had any real interest in 56-Mc. work had his own pet system for predicting DX outbreaks. Phases of the moon, the 27-day cycle, coincidence of skip and certain types of cloud formations, various complex mathematical sequences — these are just a few of the "signs." All of us have had our hunches rudely upset occasionally, but most of us still feel that we can go further in the prediction of skip than merely stating that it can be expected to occur most frequently between May and August.

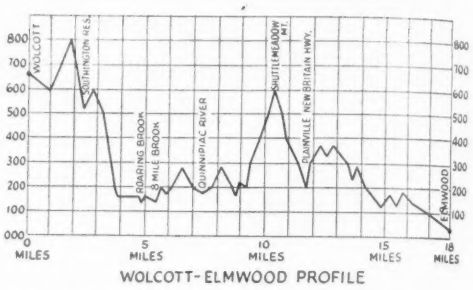
A number of amateurs have gone to great ends to gather all possible data on the occurrence of sporadic-E skip. Best known, and undoubtedly the most ambitious, is Mel Wilson, W1DEI. Some years back, when there was more time for such things, Mel established a group of DX reporters at key points across the country. By prodigious effort, and with the unfailing coöperation of his little band of enthusiasts, Mel amassed a pile of data on skip DX which is almost unbelievable in its completeness. Reports collected by *Radio* and *QST* added to it. All the DX reported to your conductor in 1939 and 1940 is in there, and just now reports for 1941 are being sifted out from the year's correspondence to be added to the picture.

It is unfortunate that there should have to be a break in the continuity of these data, for long-term records are needed. Reports from points outside the United States would help, too —

*329 Central St., Springfield, Mass.



The "weather transmitter" at W1AIY, Wolcott, Conn., consisted of a small oscillator using a type 37 tube (left) modulated with a tone oscillator which was keyed by an anemometer. Receiver is at the right. This setup provided W1AIY with wind velocity readings for five years.



WOLCOTT-ELMWOOD PROFILE

Graphic representation of the path between W1AIY, Wolcott, and W1HDF, Elmwood, Conn., which has been bridged on 224 Mc.

Mel's idea of a perfect world would be one in which there were active 5-meter stations in every country, with conscientious reporters of DX in every station! But the blackout of amateur 56-Mc. activity does not necessarily mean that the war period will be a total loss. There is increasing commercial occupancy of the frequencies close to the 56-Mc. band. Television stations immediately adjacent to the band are fine, and the 42-50-Mc. f.m. band is close enough so that observations in this range will be useful.

So here is an amateur job, and a mighty interesting one, too, for the duration. You owners of f.m. receivers can have a pile of fun and gather valuable data by observing conditions on the f.m. band. Watch for unfamiliar signals (there will be plenty of them in another month or so) and log the calls, time, signal strength, and other data whenever stations in other parts of the country are heard. Note what sections of the country are coming through, and be on the watch for real DX which may be of multiple-hop nature. Mail reports (note new address) so that they will be in your conductor's hands by the 25th of each month. Reports will be summarized in *QST*, and all data will be turned over to W1DEI or any other amateur seriously interested in studying it.

Up to December 7th, the furor over increasing activity and expanding DX horizons on 56 and 112 Mc. caused the 224-Mc. band (which, incidentally, in kilocycles comprises 34 per cent of amateur radio's stake in the radio-frequency spectrum) to be pretty much lost in the shuffle. There have been sporadic efforts directed toward the establishment of activity on 1¼, but, on the whole, work here has been confined principally to scattered experimenters who have considered themselves fortunate if they could get in a contact or two by the simple expedient of building two

complete stations and then lending one of them out to any local who would volunteer to operate it.

Most of us were the gregarious sort. Experimentation was fine, so long as it resulted in better signal reports, more contacts, or better DX; but we'd spend endless hours battling QRM rather than engage in the spade work necessary to develop new fields. Activity on Five boomed only after a series of articles in *QST* ('way back in 1931, remember?) showed that here was a band where we could get going with a minimum of effort and have lots of fun talking around town with the gang. Once in there in large numbers we began to discover the real possibilities of this band, with inversion bending, skip DX, and aurora reflection coming along as by-products of our urge to talk with one another.

We had a 2½-meter band then, but very little was ever done there until we were pushed into it by the stabilization regulations of December 1, 1938. This date, to many of the occupants of Five, was almost as black as December 7, 1941; yet its ultimate result was to give us a whole new band, in 2½, and to establish Five as a major band for nationwide work. After the initial rush to get going on 2½ settled down to a period of development, we found that this band, too, had some characteristics all its own. Contacts up to 150 miles were found to be easy, when conditions were right, with signals over long paths frequently exceeding those encountered on 56 Mc. under similar conditions.

But what about 1¼? Though amateur work has been going on there since Ross Hull's pioneering efforts back in 1934, we have never had enough doing to learn anything of the vagaries of wave propagation on the frequencies above 224 Mc. It may be a long time before we are permitted to communicate with one another on any band, but what more logical time than now to be getting in some experimental licks with gear for 224 Mc. and higher? Workers who have had a try at u.u.h.f. agree that most of the pleasure and satisfaction to be derived from this effort comes when a transmitter or receiver is finally made to "perk" and the band is definitely established on both by the use of Lecher wires — rather than from any contacts which might be made. What low-cost tubes can be made to perform on these frequencies? What type of oscillator circuit gives the best stability and output? Can satisfactory performance be obtained from t.r.f. stages in receivers? How about crystal control? What are the possibilities of the converter type of receiver, especially in conjunction with f.m. i.f. systems? These and countless other questions have never been given any real study — and they all can be worked on for endless hours without ever getting to the point of radiating a signal or having a QSO. Add to this the fact that if we are to have any reasonably unrestricted amateur operation before the end of the war it will be on the frequencies above 224 Mc., and one can see why this work need not be regarded as a waste of time.

What works on 1¼? Probably the best answer to this question lies in a perusal of the work done there prior to Dec. 7th. Looking back through our correspondence since the fall of 1939, we find that upwards of fifty fellows have reported activity of some sort. The list below shows what some of them have used, and what they were able to do with it.

Call	*Location*	*Equipment*	*DX, Miles*
W1AIY	Wolcott, Conn.	HK-24 osc., 23 watts [1]	45
W1AJJ/1	Mt. Washington, N. H.	HY-75, 20 watts	90
W1BBM	North Harwich, Mass.	HY-75, 15 watts	—
W1COO/1	Mt. Washington, N. H.	HK-24's p.p.	90
W1HDF	Elmwood, Conn.	HK-54's p.p., 160 watts	30
W1HDQ	Wilbraham, Mass.	35TG, 150 watts	45
W1JJR	Hartford, Conn.	HY-75, 15 watts	15
W1JK	Exeter, N. H.	316-A, Peterson Pot [2]	90
W1KLJ	Bristol, Conn.	HK-54, 100 watts	40
W2TY	Hollis, L. I.	HY-75's p.p., 50 watts	—
W3HDJ	Delanco, N. J.	304-B's p.p., 100 watts	12
W3CUD	Collingswood, N. J.	HK-54's p.p., 100 watts	12
W3VX	Audubon, N. J.	834 Peterson Pot	12
W4FKN	Atlanta, Ga.	HK-24, 25 watts	—
W6IOJ/6	Chatsworth, Cal.	HY-615, 5 watts	135*
W6LFN/6	San Diego, Cal.	HY-615, 5 watts	135*
W6QKM	Los Angeles, Cal.	HY-75, 15 watts	—
W6ANN	San Pedro, Cal.	35TG's p.p., 100 watts	—
W6MYJ	N. Hollywood, Cal.	316-A, 35 watts	—
W6QG	Santa Ana, Cal.	35T's 100 watts	—
W8GU	Erie, Pa.	834's p.p., 100 watts	55
W8IPU	Lakewood, Ohio	HK-24's p.p., triplers, *xtal*	15
W8UKS	Lorain, Ohio	HK-24's p.p.	15
W9FHS	Chicago, Ill.	HY-75, 20 watts, HY-114 xcvr	—

* Two-way DX record on 1¼.

[1] "The 227-Mc. Rig at W1AIY," *QST*, Aug. 1941, p. 38.

[2] "High-Q Tank Circuits for Ultra-High Frequencies," Peterson *QST*, Sept. 1939, p. 19.

Activity on 1¼ wasn't started yesterday. Ross Hull, always years ahead of the rest, was at it back in 1934; and his article, "Firing Up on the Newly-Opened Ultra-High Frequencies" in September, 1934, *QST*, is still useful reading. Thumbing through the *QST* file turns up the following which should be of value to anyone contemplating experimental u.h.f. work: "A New Type U.H.F. Transmitter," King, Sept. 1935, p. 30; "An Unconventional Receiver for U.H.F.," Hull, Feb. 1936, p. 21; "Working at One Meter and Below," Hull, Sept. 1936, p. 23; "Multi-tube Oscillator for U.H.F.," Zottu, Oct. 1936, p. 21; "A Packset for 200 and 300 Mc.," Sigmon, March 1938, p. 16; "Exploring Below One Meter," Tynes and Babcock, May 1939, p. 16. For deeper stuff, "Radio at Ultra-High Frequencies," a publication of RCA Institutes Technical Press, is distinctly worthwhile, and, of course, the various technical publications such as *RCA Review*, I.R.E. *Proceedings*, and others, have presented material frequently for several years which will be of interest to the technically-qualified u.h.f. worker.

As long ago as the winter of 1935–6, Ross Hull was putting an S-8 signal up to your conductor in

(*Continued on page 60*)

IN THE SERVICES

WE HEAR this occurred one afternoon at the new airfield near Fort Crockett, Texas:

W9— was circling over the field in the pilot's seat of a PT anxiously waiting for instructions from the control tower when suddenly his radio went dead. Ham ingenuity came to the fore, and he immediately started tinkering; meanwhile his ship circled continuously around the field. In the middle of his fussing with the gear a voice from the control tower boomed through his earphones. "If you can hear me, rock your wings," the voice thundered. With an expression half of surprise and half delight, the excited pilot-ham grabbed his mike and shouted: "Attention, control man: if you can hear *me*, rock your tower!"

SIGNAL CORPS

SCM Jessup of Idaho, 7CRL, is being commissioned in the Electronics Battalion and will receive training at Ft. Monmouth. The Alaska Communications System unit at Bethel boasts three operators: Van de Water, 7GJP; Taylor, 7HSD; and Motter, 7IWH. Col. Davis Boyden, 1SL, formerly communications officer of the Massachusetts home guard organization, has been called to active duty at the Boston Army Base Signal Office. Selectees Ligman, 9CVD, and Murphy, 1IRF, are receiving training at the Fort Monmouth signal school. Selectee Bailey, 5FTW, has completed his, and is now assigned to the 56th Sig. Bn. at Ft. Jackson, S. C. Huffaker, 6QYR; Paulson, 6PJS; Keeler, 6FRN; and Neilson, 6QAM, are engaged in various SC work. Selectee Spielberg, 9AUM, is assigned to the New Orleans air base, 422nd Sig. Co.

Tech. Sgt. Vogt, 7ASG, is chief op at WVAQ, Ft. Stevens, Ore. At Capitol R.E.I. for the technician's radio course are Vincek, 2LNT, and Hunsucker, 4HEV. Selectee Schroder, 2MVU, attends radio school at Camp Gordon, Ga. Lt. Thompson, 4CWV, has interesting duties with the 123rd Sig. Intelligence Co., Ft. Benning, Ga. Pvt. Matusewich, 2FKE, has just left the latter post for assignment to the 101st Co., Camp Shelby, Miss. Lt. Col. Beasley, 9FRC, has been transferred to SC work in Washington. The operating gang at 5th C. A. Hq., Ft. Hayes, Ohio, include Dye, 8APC; Lohner, 8RN; Davis, 8EOY; and 8DBG. Pvt. Marts, 9TDH, pounds brass at WUI, Ft. Riley, Kans. Lt. Monderer, 9VCX, has been transferred to the Canal Zone.

ARMY, GENERAL

WE HAVE the following warm, and much-appreciated, letter from Frank Robb, GI6TK:

". . . if any of your readers have American friends in Northern Ireland, we would be delighted to welcome them at our club or homes and extend to them ham hospitality. The following amateurs will be able to put them in touch with any other amateur they may desire to meet: City of Belfast YMCA Radio Club, GI6YM, City YMCA, Wellington Place, Belfast; Club night every Wednesday night from 7 P.M., also open every week night except Sunday. Bob Holden, GI5HU; 260 Grosvenor Road, Belfast, secretary of YMCA Radio Club and also Radio Society of N. I. Jack N. Smith, GI5QX; "Ben-Venuto" 19, Hawthornden Drive, Belmont, Belfast, N. I.; 'Phone Belfast 63323; district representative of Radio Society of Gt. Britain. Frank A. Robb, GI6TK; 60, Victoria Ave., Sydenham, Belfast, N. I.; Hon. Treas. of GI6YM.

"The above amateurs are only a very few of those in Northern Ireland who would be delighted to meet any of their American friends and, if the boys will look them up at any time or leave a message where they can be found, they will get a hearty welcome. . . ."

Facilities and engineering personnel of Chicago's television station W9XBK are being used by the Navy for radar training of amateurs. Here we see instructors Osterlund, 9TJL, Brolly, ex-6RG, and Cusack, 9QEE, heating up a 20-inch cathode-ray 'scope; kneeling students are Mueller, 9NVL, Cillo, 9USK, and Clarke, 9RUJ. Kunz, 8SNS, is a fourth instructor at the school.

In radio work with Hq. Co. 180th Inf., Camp Barkeley, Texas, are Mstr. Sgt. Morgan, 5RU, and Tech. Sgt. Trammell, 6QZE. Staff Sgt. Heysek, 8WQS, handles communications for the 2nd Bn., 35th A.R., Pine Camp, N. Y. Pfc. Kreton, 9SIY, instructs at Camp Wallace, Texas. C.A.R.T.C. Selectee Oldt, 3HPL, and Bradburry, 5CIQ, attend radio school at Ft. Bragg, N.C. Capt. Porter, 5AKZ, M.C., keeps the 53rd Sig. Bn. at Camp Bowie, Texas, in good health. Communications chief of the 2nd Bn. Hq., 122nd F.A. at Camp Forrest, Tenn., is Tech. Sgt. Mayhercy, 9MUH. Staff Sgt. Baxter, 9MQI, is assigned to the 795th T/D Bn., Ft. Custer, Mich. Pvt. Simmington, 5HAV, is studying radio at Camp Roberts, Calif., F.A.R.T.C. In the 27th Division at Fort Ord, Calif., we find Staff Sgt. Jacobs, 2JGC; Sgt. Buzarack, 2KZZ; Yeomans, 8MFQ; Uhorchack, 4HLL; Montone, 4HOO; Pvt. Wood, 8UCO; Ruby, 8QUN; Mellone, 8WIX; and Hobling, 2MMP.

Communications personnel of Hq. Co., 2nd Armored Division, Ft. Benning, Ga., includes Mstr. Sgt. Alewine, 9BXE; Sgts. Bedat, 4HRO; Daddysman, 3EZX; Jurko, 8UAS; Pvts. Dirden, 6ABE; Hake, 6KHG; Webb, 9MDZ; and Woehrman, 9VJC. Pvt. Strobo, 9YKL, is attending the gunnery school at Las Vegas, Nev. Lt. Tilley, 5DQM, is assigned to Ordnance work at Talladega, Ala., and Barnes, 3FZH, to M.P. at Camp Blanding, Fla. Pvt. Crowe, 8SEM, has duties with the 107th Cavalry, Ft. Ord, Calif. Arsics, 2MCF, is "on the list" for officer school. Pvt. Fucetola, 2OHN, wants to transfer to the Air Corps. Lt. Wolf, 9AWR, is with the 35th Div. M.P., Camp San Luis Obispo, Calif. Lt. Col. Glover, 3EI, is assigned to the 846th T/D Bn., Camp Livingston, La. Selectee Newton, 8VJP, is awaiting assignment. Pvt. Wales, 5KLZ, has duties with the 2nd Bn. 260th C.A., Ft. Lewis, Wash. Tech. Sgt. Deal, 9HLR, is now at the War College, Washington. Staff Sgt. Harvey, 4IHA, is assigned to the 60th F.A. Bn., Ft. Bragg, N. C.

NAVY

ROBERT and Hugo Holmquist, 1MBM and 1MWY, twin brothers of Providence, R. I., have enlisted as RM2c in Radar training. Radioman Walczak, 8QCH, in charge on the *Gull*, is proud of his promotion to RM1c. RM3c Munroe, 8WRK, is doing C.G. duty in Cleveland. Breetz, 8QLP, and Stephens, 6JRW, are doing aircraft radio work in the Naval Research Lab.; RM2c Hand, 2NFT, has just left there for active duty on the *Bidelle*. SCM Thompson of Alabama, 4DGS, is being called to the Bureau of Ships, Washington. Lt. (jg) Evans, 1BFT, is now C.O. of the *Arkansas*. RM2c Goldberg, 2IEK, is serving on the *PC-509*. Ed Braddock, 3BAY, leaves RCA's amateur section for assignment to the Army-Navy priority board, Washington, as Lt. Commander. Ens. Thompson, 8VKP, is serving at Naval Intelligence, Washington. RM2c Wolf, 1NVN, operates on the *Jouett;* Kulmus, 8LYW, on the *Wichita;* Housenfluck, 5HYD, on the *Narwhal;* Brown, 1HZE, on the *Mattole;* Craig, 6HLR, on the *Tuscaloose;* Rubin, 1MQL, on the *Fanning;* and Windland, 3HLE, on the *New York*. Larson, 1NKM, stationed at Norfolk, believes he might be the first man enlisted in the new rating of Aviation Radioman, second class. RM1c Lewis, 6DAZ, is leaving NPL at San Diego for points yet unknown. In the Marine Corps we find Pvt. Frye, 8VGZ, at the Quantico, Va., radio school; and Latimer, 1NFF, at Portsmouth, N. H. RM1c Gelardi, 1CCX, is assigned to the new Radar school at Treasure Island, Calif.

In the January class of will-be commercial operators at Gallups Island, we find the following hams: Wondergem, 1NDA; Upton, 1NSM; Hagewood, 4IDM; Boswell, 5KNI; Handsaker, 6QUY; Cunningham, 6SXQ; Sabourin, 6TFH; Calwhite, 7IIN; Chilinski, 8VRP; Rademacher, 9KET; Klay, 9ORG; Littlejohn, 9SPK; Tangen, 9YNX; 3JXL. Lt. (jg) Hathaway, 7BCV, is on duty in Seattle. RM3c Williams, 4HKF, is stationed at radio central in the South Carolina Navy Yard. Stoffel, 3HOM, operates at the Naval Air Station in Trinidad.

We regret to record that RM3c Walter Brothers, 4EKR, was killed in action on February 18th. "Woody" Smith, 6BCX, and Ray Dawley, 6DHG, formerly on the staff of *Radio*, are with the Bureau of Ships, Washington. Lt. (jg) Siegel, 2NEM, is assigned to the supply dept., Brooklyn Navy Yard. More radar men are West, 9NHF, at Great Lakes N.T.S., and Russell, 9PBU, at Chicago's Armory.

To All Amateurs in the Services:

One of the most important justifications for the government's encouragement of amateur radio in peacetime is that in time of war our ranks furnish trained personnel for all communications phases of the war effort. To point with pride to the accomplishments of the American amateur during this war, after it is over, we need factual data on each and every ham who saw military communications service.

We have several thousand names now, thanks to those of you who have already registered with us. But we know we lack many thousands more. If not already on record with us, please do your part in building up the case for amateur radio, to make it easier for League officials to secure the return, come peace, of all our amateur privileges. A postcard will do the job. Include your name, home call, rank, radio duty and outfit to which assigned, and whether previously AARS or NCR.

★ THE EXPERIMENTER'S SECTION ★

SINCE this had to be written only a few days after the March issue was off the presses, it is natural that there is not a great deal to report in the way of progress in the various experimental projects which were outlined in that issue. However, we have already received responses from several enthusiasts who are eager to get started along one line or another. We also have some suggestions for other projects.

Albert E. Hayes, jr., has volunteered to take over the appointment of Group Leader for the section on Acoustic Systems for Aircraft Detection. All those who are interested in this project should communicate with and report to Mr. Hayes at The Radiation Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

Bob Shaw, W3AOC, is interested in the carrier-current project. He and another local ham are setting up some gear and would like to hear from others interested in the Philadelphia area.

COMMUNICATION BY MEANS OF EARTH CURRENTS

DURING the last war, the French army did a certain amount of work with a system which they called *"telegraphie par sol"* in which the transmitter consisted of a buzzer or spark coil connected to a pair of widely-spaced ground rods, while the receiver consisted simply of headphones connected across a similar pair of ground rods. In considering the projects which might be listed in the Experimenter's Section, we had felt that the prospects of this system were not as bright as those of some of the others. However, the following letters tell a different tale!

"I think you have something in the new Experimenter's Section of *QST*. Your various suggestions are swell and sure are worth looking into. But I want to suggest another means of communicating without radio that I just tried out this morning (and froze my feet doing it). It is communicating by means of earth currents. Two metal pipes in the ground connected to a source of current make up the receiving end.

"The first transmitting rig was made by hooking the 110-volt a.c. line to the two ground posts with a telegraph key in series with the hot side of the line. (!! Lucky the ground was frozen! If you try this, use a resistor in series. — Ed.) The receiver was the audio system of my communications receiver, a Sky Buddy with one ground post hitched to the grid of the first audio tube (6SQ7) and the other to the ground terminal of the receiver. With the pipes spaced at fifteen feet and the two systems fifty feet from each other, the results weren't very satisfactory, but a readable 60-cycle hum was produced in the speaker of the Sky Buddy when the transmitting key was pounded.

"Not giving up, I had the bright inspiration of trying an old Model-T Ford spark coil. After hooking the high-voltage secondary to the two ground pipes and rigging the key and four pretty-well-shot dry cells in series with the primary, I tried it out. You can imagine my astonishment when the whine of the vibrator came echoing back from the Sky Buddy on the back porch of the house all the way up to the shack, with all doors shut. The arrangement is shown in Fig. 1. My elation simply tremendous, I tried decreasing the spacing of the pipes of the individual systems. I succeeded in getting a faint but perfectly readable signal when the spacing was as small as two feet at the receiving end and three feet at the transmitting end, still keeping the original distance of fifty feet between the systems. All of this was accomplished with very poor grounds, since the ground is very dry in the winter. As a matter of fact, the ground was so hard that I couldn't get the pipes in more than eight inches.

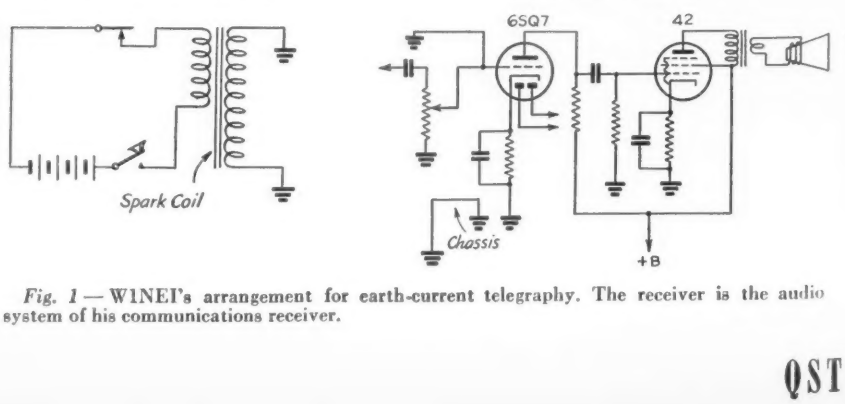


Fig. 1 — W1NEI's arrangement for earth-current telegraphy. The receiver is the audio system of his communications receiver.

"Now, I think that with better grounds and a better audio amplifying system, and proper shielding to reduce 60-cycle a.c. hum pickup from nearby power lines and a more powerful and suitable transmitter (perhaps one of these rock-crushing transmitter Class-B modulators with an audio oscillator on the front end), distances up to one hundred times the spacing of the pipes in each ground system would be practicable. I am pretty positive that this ratio would work for short distances like the fifty feet that I tried, but the big question is would this same ratio hold for longer distances, say five miles?

"As I live out of the city it would be easy for me to get a couple of good grounds almost three-eighths of a mile apart. Thus, if it would be possible to work 100 times that distance it would mean that I could work out about thirty-five to forty miles. Even enthused as I am, I will admit that that sounds quite fantastic. Of course, the guy at the other end would have to have a similar system.

"However, I guess that most fellers wouldn't be able to get good grounds more than a hundred feet or so apart, but even that amounts to two miles as a working distance, I hope. Another thought that comes to my mind is the possibility of using a 60-cycle filter to eliminate hum pickup in the audio receiving system. Also I think that if a spark coil is used as a transmitter, it ought to be shielded to eliminate b.c. interference.

"Well, I have a friend who lives about three miles away and I am going to see him about trying out all this foolishness and I sure will tell you all about it." — *Leslie C. Merrill, W1NEI*

"Referring to the Experimenters Section of this month's *QST*, I would like to have you investigate the possibilities of a stunt that I was pursuing some 25 or 30 years ago and which I subsequently gave up.

"The plan is roughly this: I was able, 25 or 30 years ago, to transmit the voice over a distance which, if my memory serves me correctly, ran up to 3 to 5 miles. No radio was concerned in this plan, the main idea of the system being to send the voice through the ground.

"At that time, I was using nothing more than a single-button microphone connected to an induction coil and two ground connections which were widely separated. I also remember that the separation between the two ground connections definitely determined the distance that the voice could be sent through the ground. In making the ground connections, one of them was on what I call a perfect ground, which consisted of a water pipe system, while the other one was sort of top-soil ground made by driving a metal stake into the ground for five or six feet.

"I also tried making this second ground in the salt water and this increased the distance over which I was able to talk. I can still re-

(Continued on page 66)

25 YEARS AGO THIS MONTH

TUSKA used to determine how many pages should be in *QST* by ascertaining how many could be paid for by the cash receipts of the previous month. With a growing magazine, this was an interesting system and for April, 1917, the answer was 96 pages. Since war was to break out in a few weeks and cause *QST* to taper off, this was the highwater mark of the pre-war issues. It was marked also by the first of the admirable covers by Clyde E. Darr, this one showing Uncle Sam watching an amateur at work in his station and saying, "Good work, sonny."

The big news of the month is new relaying records. On January 27th a message crossed the continent one way in one night, for the first time in amateur history, the route being 6EA, Seefred Brothers, Los Angeles; 9ZF, Captain W. H. Smith, Denver; 9ABD, W. P. Corwin, Jefferson City; 2AGJ, Hewitt, Albany; to 1ZM, Maxim at Hartford. The advent of 9ZF at Denver was the key to the new success. Finally on February 6th, in the early hours of the morning, a message was relayed across *and its answer returned* in the elapsed time of one hour twenty minutes, a record due to stand until well after the war. This message originated with 2 PM, the station of Faraon and Grinan in New York, and went by 8JZ, Rev. A. J. Manning, Cleveland, thence via 9ABD, 9ZF and 6EA, the reply coming back the same route.

ARRL announces the successful completion of preparations for expansion of the organization to make the management representative of the entire country. A series of meetings has been held in New York City with representative amateurs in attendance and a new constitution adopted. Details will be announced next month. . . . Meanwhile war is but a few weeks away. The Navy is calling for amateurs and has circularized all hams, soliciting either enlistment or enrollment in the reserve. The editor says, "It is frankly stated that we are expected to give one or the other of them, provided our personal interests are not seriously jeopardized by so doing." The League's Department of Defense reports 5425 licensed stations prepared to relay traffic between government posts much more effectively than the government stations can do it.

Professor L. A. Hazeltine leads this month's technical parade with an article on "Losses and Capacity of Multilayer Coils," while Professor W. C. Ballard treats "Antennas and Grounds." TOM, in "Rotten Tuning," deplores "the way some of these ginks tune their transmitters." An unusual imaginative story, "One Too Many for Adam," is contributed by Ryer Knickerbocker Borden — who, we'll now tell you after all these years, is none other than Mrs. A. A. Hebert.

1941 Sweepstakes Contest Results

Previous Records Shattered by Wide Margin

BY J. A. MOSKEY,* WIJMY

EACH year we find ourselves reporting, and truthfully, the annual SS as the best ever. As we sat down to analyze the logs for the Twelfth Annual Sweepstakes Contest, November 8–9 and 15–16, 1941, there existed in our minds a question, "Would this popular annual operating jamboree measure up to past standards?" Countless numbers of our best operators were already on active duty with Uncle Sam in November and there were many silent stations whose signals had echoed that classic call "CQ SS" the year before. But any doubt in our minds as to the success of the fray soon disappeared. The 1941 SSers, old timers and young squirts alike, took hold of things and did a bang-up job of producing an excellent crop of record-breaking scores, and had a whale of a time for themselves!

Since 1939, when our neighboring friends the VE's were forced to leave the air, there have been 64 active ARRL Sections to be worked in major contests. Every one of these was active during the Twelfth Sweepstakes, and logs were received from all but Hawaii and Western Florida. There were *1071* logs entered, 839 c.w. and 232 'phone.

The 1941 SS was a contest featured by several new records for operating achievement. In 1940 three operators made c.w. score totals over 100,000. This time no less than *eight* participants topped that figure! The all-time high of 737 contacts made in last year's affair was replaced by a new record of *831* QSOs. More about that later, though. Let's get on to the winners.

* Assistant to the Communications Manager.

The Winners

Sweepstakes competition for awards is, according to the rules, only within individual ARRL Sections. Certificates attesting to the contestants' accomplishments are awarded to the high-scoring stations in each Section. We take much pleasure in presenting 61 of these to c.w. participants and 56 to operators who used 'phone. In a contest as keenly competitive as this SS was, theirs is certainly a well-earned victory, and we are sure the rest of the gang join us in extending sincere congratulations. Following are the winners in their respective Sections: *C.W.* — W1AUN, W1AVJ, W1BBN, W1EJK, W1KQY, W1OR, W1RY, W2IOP, W2JAE, W2MBS, W3BES, W3GAU, W3ITR, W3IWM, W4AIH, W4AKH, W4DAM, K4DTH, W4MR, W4VX, W9MHU/4, W5FFW, W5GEL, W5HTL, W5IWL/5, W5JEW, W5JTO, W5KC, W6BVM, W6EUH, W6GWW, W6IOJ, W6MRT, W6MVQ, W6NIK, W6RWW, W6YX, K7CZY, W7ENW, W7GDU, W7HMQ, W7VY, W7ZN, W8EUY, W8IFT, W8JIN, W8KWI, W8NCJ, W9FS, W9GBJ, W9GFF, W9JRI, W9KBL, W9LDH, W9NKM, W9OTR, W9OUH, W9RQM, W9WUU, W9VKF, W9ZAR. *'Phone* — W1AVP, W1FOV, W1GUF, W1HKK, W1HRI, W1KSK, W1LOA, W2EGG, W2JKH, W2NSD, W3BET, W3EQK, W3EZR, W3HDJ, W4AQN, W4BQE, W4FLS, W4FPM, W4GRL, W1JCI/4, W5ESB, W5EWD, W5FH, W5FJP, W5HNW, W6CHV, W6DTB, W6DZE, W6GSB, W6GVM, W6ITH, W6IWU, W6OGZ, W6PQG, W6SG, W7FLD, W7HZD, W7HZR, W7QP,

Left: W8IFT, Michigan C.W. winner. *Right:* W9GFF, Illinois C.W. winner; club award winner (C.W.) Cahokia Amateur Radio Club.

W8FMF, W8MHD, W8NNF, W8PXP, W9ADJ, W9DJV, W9GWL, W9KQX, W9LVZ, W9OMG, W9NDA, W9RBI, W9RVS, W9YNX, W9YQN, W9ZIX, KA7FS.

Club Participation

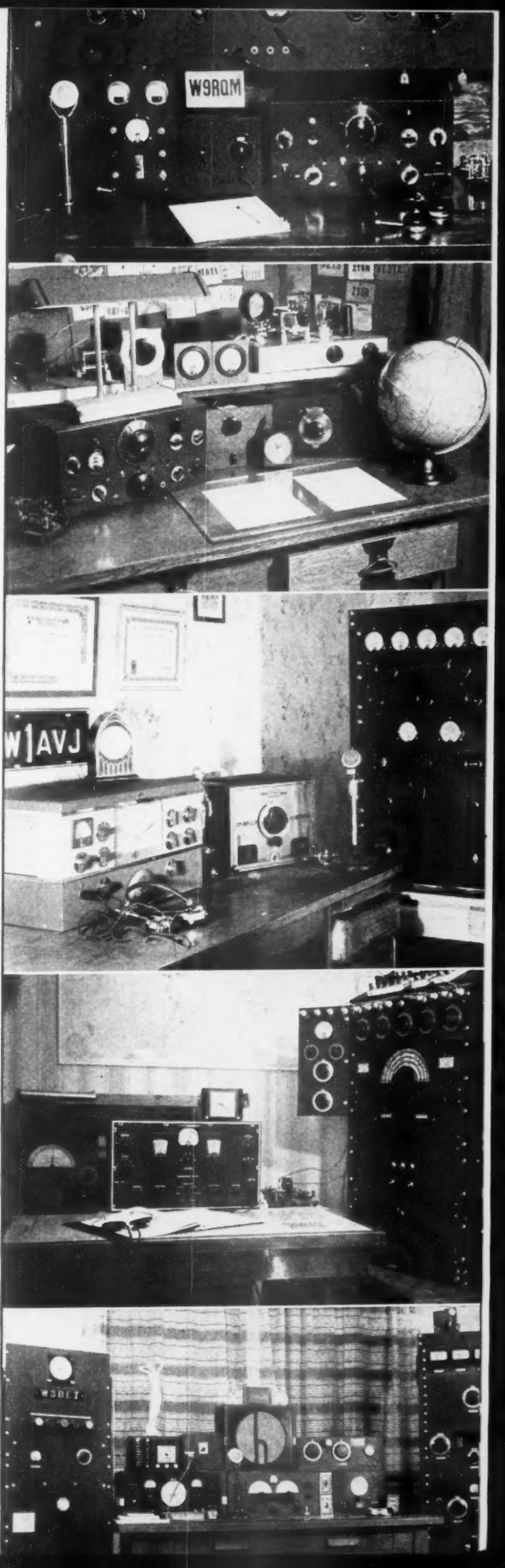
Frankford Radio Club of Philadelphia once again wins the gavel award given yearly to the club submitting the highest aggregate score, with their group total of 1,231,956 points. Represented by twenty-nine participants in the SS, this group of live wire ops is making good their boast of "a gavel for every member," put forth a few years ago after their acquisition of the award for the third time. This occasion marks their winning of a gavel for the sixth consecutive time! Such consistent effort deserves a big hand. We take our hats off to you, Frankford!

With a score almost one hundred and fifty thousand points higher than their entry of last year, the Greater Cincinnati Amateur Radio Association again took second honors, 1,080,359 points . . . 44 participants. Third high in '40, the Milwaukee Radio Amateurs' Club also came through in that position in this SS . . . 697,246 points by 35 operators. The New Haven (Conn.) Amateur Radio Association stepped up from a previous fifth to fourth place with a total of 312,678. Next on the list of club highs we find the Cahokia (Ill.) Amateur Radio Club, 282,446. An accompanying tabulation indicates the standings of remaining clubs in the competition. Special certificate awards are being made to the leading stations (c.w. and 'phone) in each club having three or more participants, and the calls of these individual winners are also listed.

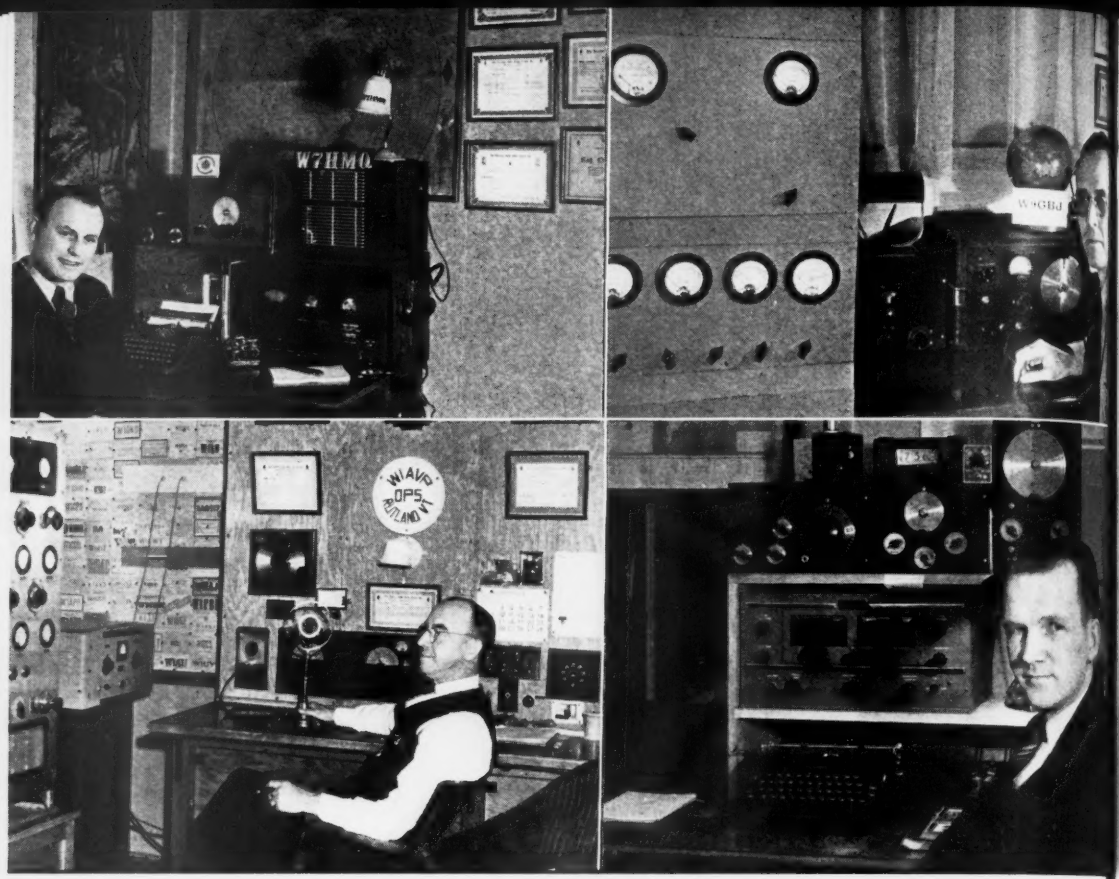
High C.W. Participants

The best all around operating performance ever attained in an ARRL contest of national coverage was, we think, that of W9FS in the 1941 Sweepstakes. So far ahead of all other contestants that there can be no question of his right to the title of all-time SS record holder, Bert Brown came through with 831 stations worked in 63 Sections (KA was the only one missed) for the staggering total of 130,883 points! In addition to leading the country, he also broke all Sweepstakes "stations per hour" records with an average of 21.2 per hour. Our heartiest congratulations to you, Bert, on a showing that will be mighty hard to beat!

Veteran W3BES, dangerous competition in any contest, was second national high, scoring 115,165 points — 744 contacts, 62 sections. Another Eastern Pennsylvania operator, W3DGM, placed next in line by working 705 stations in 62 sections



Top: W9RQM, fifth national high scorer; Wisconsin C.W. winner; club award winner (C.W.) Wisconsin Valley Radio Ass'n. *Upper center:* W6IOJ, Los Angeles C.W. winner. *Center:* W1AVJ, New Hampshire C.W. winner. *Lower center:* W9VKF, Southern Minnesota C.W. winner. *Bottom:* W3BET, Eastern Pennsylvania 'phone winner.



Upper left: W7HMQ, Utah-Wyoming C.W. winner. *Upper right:* W9GBJ, Missouri C.W. winner. *Lower left:* W1AVP, Vermont 'phone winner. *Lower right:* W1AUN, Western Massachusetts C.W. winner.

for 109,198. In the hundred thousand class were five other contestants: W2JAE, 108,885 — 714 contacts, 61 sections; W2IOP, 106,446 — 718 contacts, 61 sections; W9RQM, 106,330 — 688 contacts, 62 sections; W9DIR, 104,440 — 696 contacts, 60 sections; W8JIN, 102,690 — 653 contacts, 63 sections.

Other national high scorers include W1TS 99,583, W8OFN 98,439, W9GFF 95635, W8HGW 95,524, W9YFV 94,550, W9FOI 90,900, W9BRD 90,051, W3GAU 83,700, W9VDY 83,570, W8OKC 83,550, W3HFD 83,235, W9YWQ 82,800, W5JTO 81,065, W3ITR 79,650, W9ZAR 79,650, W9VKF 78,895, W8RSP 78,300. W3FRY 77,500, W1KQY 76,950, W3HYT 76,036, W5KC 75,335, W3IKW 75,330, W2LZR 73,805, W8UUW 72,735, W9JRI 71,765, W8ROX 71,025.

Setting a new high for number of contacts was W9FS, who worked 831 stations. W3BES broke his own record of last year by making 744 QSOs. Following with more than 600 contacts each were W2IOP 718, W2JAE 714, W3DGM 705, W9DIR 696, W9RQM 688, W9JIN 653, W8OFN 649, W9YFV 620, W9GFF 618, W8HGW and W9FOI 607.

The highest scorer in each district: W1TS 99,583, W2JAE 108,885, W3BES 115,165, W4AKH 60,662, W5JTO 81,065, W6IOJ 65,844, W7VY 65,760, W8JIN 102,690, W9FS 130,883.

Sections Worked

In the two previous Sweepstakes Contests it was our pleasure to report the working of all sections by one or more participants. We cannot do the same in this report since no contestant accomplished that feat in this SS. The Philippines were missed in most cases, due no doubt to the special FCC orders which prohibited our working anyone but a U. S. citizen in KA. However, W8HGW, W8JIN and W9FS on c.w. and W9NDA on 'phone succeeded in working 63 sections. The following each worked 62 sections: *C.W.* — W3BES, W3BXE, W3DGM, W3FRY, W3GAU, W3GHD, W3HFD, W3HXA, W3IKW, W4PL, W4WE, W5JTO, W6BVM, W6IOJ, W9GFF, W9JRI, W9RQM, W9VKF. *'Phone* — W8QDU.

Leading 'Phones

Top scoring man in the 'phone division of the Twelfth Sweepstakes was W9RBI of Wisconsin who worked 353 stations in 61 sections to finish up with 53,680 points. Nice going, OM! The second highest score, 51,179 points (420 stations, 61 sections), was made by Indiana 'phone SSer W9YQN. His total of stations worked is greater than that of the leader but the score was lower due to the use of high power and the consequent lower multiplier. West Coaster W6OGZ snared

CLUB SCORES

Club	*Score*	*C.W. Winner*	*'Phone Winner*
Frankford Radio Club (Pa.)	1,231,956	W3BES	———
Greater Cincinnati Amateur Radio Ass'n	1,080,359	W9FS	W8NDN
Milwaukee Radio Amateurs' Club	697,246	W9DIR	W9RBI
New Haven Amateur Radio Ass'n (Conn.)	312,678	W1KQY	W1EUG
Cahokia Amateur Radio Club (Ill.)	282,446	W9GFF	W9ENI
Wisconsin Valley Radio Ass'n	212,182	W9RQM	W9RNZ
York Radio Club (Ill.)	200,969	W9YFV	W9CWP
Westlake Amateur Radio Ass'n (Ohio)	175,343	W8UUW	W8MXL
North Newark Amateur Radio Club	170,135	W2JAE	———
Canton Amateur Radio Club (Ohio)	89,212	W8QVK	———
Niagara Radio Club (N. Y.)	86,566	W8FLX	W8FMF
Queens Radio Amateurs (N. Y.)	79,318	W2NDQ	W2LGS
Western Nebraska Radio Amateurs	77,410	W9AZT	W9KQX
Parkway Radio Ass'n (Mass.)	73,052	W1MDV	W1KQN
Black Hills Amateur Radio Club (S. Dak.)	60,780	W9GLA	W9ADJ
Amateur Radio Relay Club of St. Louis (Mo.)	49,240	W9GHD	———
Hamfesters' Radio Club (Ill.)	41,525	W9LGU	———
Associated Amateur Radio Operators of Denver (Colo.)	40,119	W9CAA	W9TFP
Columbia University Radio Club	34,215	W2IZO	———
Intercity Amateur Radio Club (N. J.)	24,659	W2OAE	———
Joliet Amateur Radio Society (Ill.)	22,532	W9MFW	———

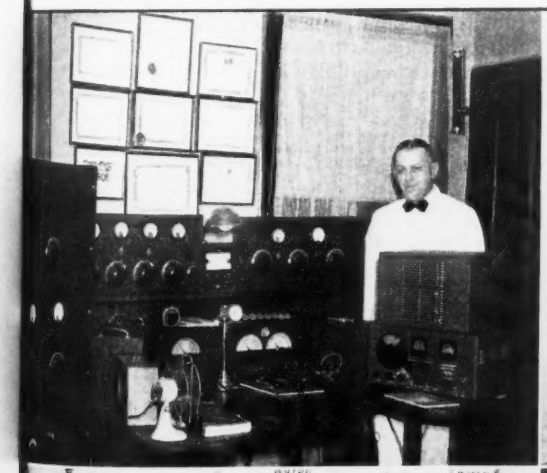
third place with 47,560 . . . 411 contacts, 58 sections. Additional outstanding 'phone scorers: W9NDA 44,730, W1HKK 43,560, W8FMF 36,410, W4FLS 31,565, W8NNF 31,065, W8QDU 29,636, W9KQX 26,538, W3HDJ 26,136, W9SZB/9 24,708, W9GWL 24,360, W5HNW 23,715, W8PXP 23,650, W9OMG 22,750, W5EWD 22,624, W5IRO 22,050, W9ADJ 21,200, W8MXL 20,856, W2JKH 20,758, W9NGG 20,240, W9HVW 20,120.

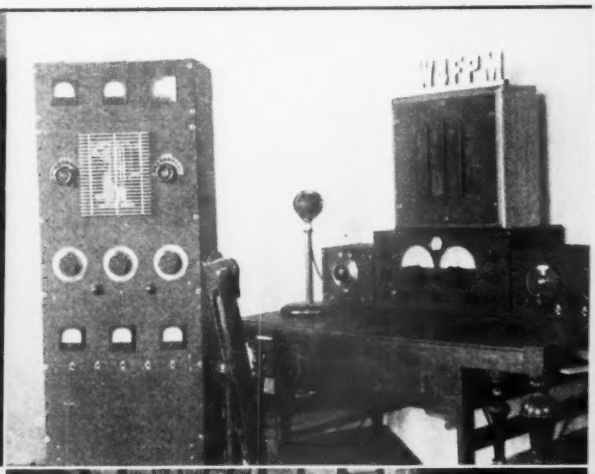
Working the most stations on 'phone were W9YQN 420, W6OGZ 411, W1HKK 366, W6AM 358, W9NDA 355, W9RBI 353, W8FMF 331, W8EMP 281, W8NNF 274, W4FLS 269, W5FH 250, W3HDJ 242, W8QDU 240, W8MXL 237, W9OMG 234, W5HNW 233, W5IRO 225, W6ULQ 221, W9ZIX 221, W9GWL 219, W9SZB 218, W8PXP 216, W6CHV 215, W6DTB 207, W5EWD 203, W1IIM 200.

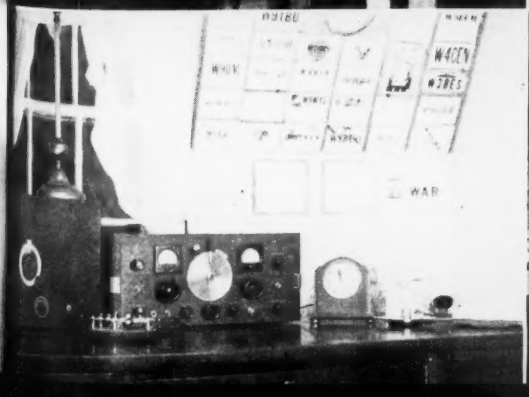
The highest 'phone scorer in each district: W1HKK 43,560, W2JKH 20,758, W3HDJ 26,136, W4FLS 31,565, W5HNW 23,715, W6OGZ 47,560, W7QP 13,363, W8FMF 36,410, W9RBI 53,680.

(Complete Scores Begin on Page 74)

Upper left: W4BQE, South Carolina 'phone winner. *Upper right:* W4FPM, Georgia 'phone winner. *Lower left:* W9KBL, Indiana C.W. winner. *Lower right:* W9YFV, second high C.W., Illinois Section; winner C.W. club award, York Radio Club.







A SIMPLE TRANSCEIVER FOR TWO AND ONE-HALF

ALMOST every ham has his pet circuit. Being experimentally inclined, I spent considerable time recently in trying one transceiver arrangement after another. Perhaps some of the other fellows might be interested in the one that has worked out best for me against all others I have tried. The circuit is shown in Fig. 1. It does not stray far from the conventional, but it has been found possible to simplify somewhat the usual change-over system.

A 1G4GT first audio feeds a 1Q5GT power output tube. The primary of the speaker transformer is used as a modulation choke when the plate-supply lead is switched to the plate of the 1Q5GT. Battery bias is applied to both audio stages, holding the B-battery drain to a low value. The three tubes draw only 10 ma. when receiving and 13 ma. when transmitting. Numerous arrangements were tried to eliminate the "mike" battery, the one shown finally being used.

The 1G4G oscillator tube is changed from a superregenerative detector to a power oscillator simply by disconnecting the low-frequency plate by-pass condenser, C_3. No change is made in the value or method of connection of the grid leak. Smaller values of grid leak connected from grid to ground on "transmit" provided no appreciable amount of increase either in input or output. The necessity for an additional set of contacts on the switch and some trouble in making the receiver "super," because of additional leads, etc., were entirely avoided. This is a little different from the usual transceiver, but it really works fine business as a test will soon prove.

The important points of construction are shown in the sketch of Fig. 2. The unit, together with batteries, is housed in a standard steel case, 15 inches by 7¾ inches by 7 inches, with handle attached at the top. Only the upper portion of the panel is shown in the sketch, since the batteries occupy the lower portion of the case. A hole is cut for the 3-inch p.m. speaker which is mounted directly behind the panel. The r.f. circuit components are mounted on a small Presdwood subpanel, approximately 3 inches by 5 inches, spaced from the front panel by sections of wood dowel. This subpanel is mounted on the left side of the front panel. To avoid socket losses, a hole to fit the base of the tube is cut in the subpanel and the tube is cemented in place. After all, it shouldn't be necessary to change the tube every five minutes! Before mounting, the base of the tube is scored between pins with a hacksaw. All tube connections are made by soldering directly to the tube pins. The tube should be placed so that the plate terminal is in the upper left-hand corner, directly below one stator terminal of the two-plate variable condenser. This should permit a

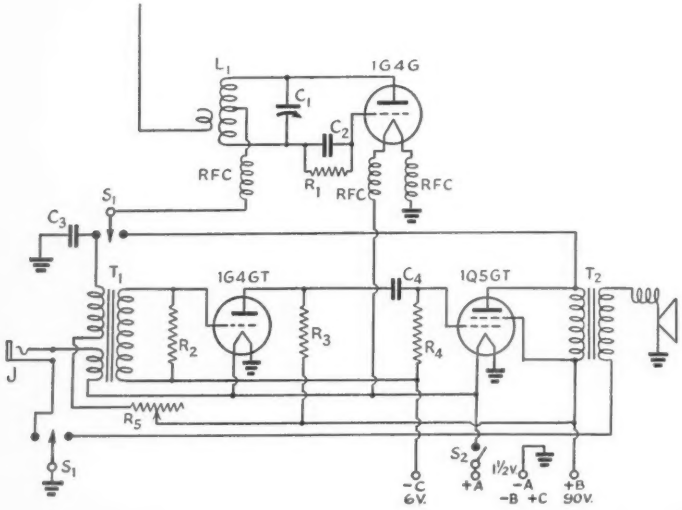


Fig. 1 — Circuit diagram of W9EMQ's 112-Mc. transceiver.

C_1 — Two-plate variable condenser (Hammarlund MC-type with all but one rotor and one stator removed).
C_2 — 100 $\mu\mu$fd.
C_3 — 0.002 μfd.
C_4 — 0.01 μfd.
J — Microphone jack.
L — 6 turns, center-tapped, No. 14, 3/16-inch diameter, 1¼ inch long.
R_1 — 1 meg.
R_2, R_3 — 50,000 ohms.
R_4 — ¼ meg.
R_5 — 50,000-ohm potentiometer with on-off switch (S2).
S_1 — Sections of d.p.d.t. toggle switch.
S_2 — See R_5 above.
T_1 — Transceiver transformer.
T_2 — Speaker transformer.

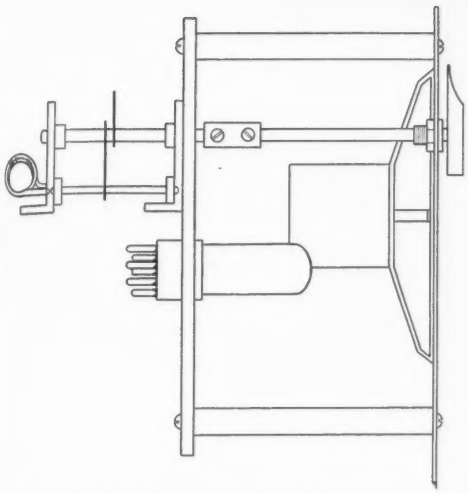


Fig. 2 — Sketch showing essential constructional points of W9EMQ's transceiver.

plate lead of one-half inch. The grid lead is only the length of the grid condenser. An insulated shaft is used between the condenser rotor and the control on the front panel.

The audio-circuit components are wired together in a compact harness before mounting them along the right-hand edge of the front panel. The change-over switch is a d.p.d t. toggle mounted in the center of the panel below the speaker. — *H. Gordon Gwinn, W9EMQ.*

—···—

WATCH YOUR CHASSIS CONNECTIONS FOR SAFETY

HERE is a safety-first kink which seems to have received meagre attention in radio publications, despite its obvious importance. It concerns power supplies where the power section is made as a separate unit from the other gear.

Fig. 5–(A) shows that if the negative of the power supply is grounded to its own chassis and a negative return wire is connected between the two chassis, a highly-dangerous situation can exist. If, accidentally or otherwise, the negative-return wire is broken or removed as at X, the full high voltage appears between the two chassis. If anyone were to place his hands on the two chassis simultaneously, he would receive the full shock of the supply. It is very easy to overlook the fact that the chassis may at any moment carry high voltage, whereas if the B– is carried to the receiver (or transmitter) by a separate wire, as in (B), all high potentials are confined to the leads which, if broken or disconnected, would be recognized as potential dangers anyway. Of course, an unsound connection of this kind is likely to be made only by the inexperienced, to whom this article is mainly addressed. Never under any circumstances should the B– be connected direct to the power-supply chassis. The golden rule for the B – should be: "First stop — receiver chassis."

If it is desired to have B– run to an external ground, this must be effected *through* the receiver frame, back via a ground wire and through the power supply chassis to ground, as in (B). Connected in this manner, no shock can result from the mere fact of a disconnected lead. My own practice, in the case of separate power packs, is to terminate the positive and negative high-voltage right on the power-pack chassis in the form of a flush receptacle and connect the receiver thereto by a corresponding plug. Fig. 5–(C) shows the idea.

This is at least one sound solution of the problem, since pulling out the plug renders the power supply quite harmless. Ordinary house fittings are quite suitable electrically up to voltages of about 500 and maybe higher.

— *Wm. H. H. Massy, Devon, Conn.*

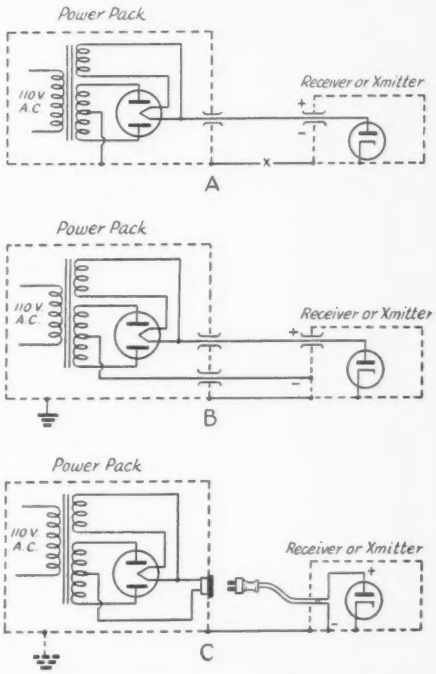


Fig. 5 — (A) Wrong way to make connections between chassis units. (B) Right way. (C) Safe plug and receptacle system.

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Strays

Clarence Bates, the pilot who miraculously escaped death as the only survivor of the crash of the air liner at Fargo, N. Dak., a few weeks ago, is well-known on the air as W9DTP.

CORRESPONDENCE FROM MEMBERS

The Publishers of *QST* assume no responsibility for statements made herein by correspondents

WCC

173 West 188th St., New York, N. Y.

Editor, *QST:*

This communication is mainly the result of my reading that story by my old friend Irving Vermilya on WCC in the February, 1942, issue of *QST*. I certainly subscribe to the sentiments expressed by the editor when those pictures arrived at Hq., for I invariably lapse into a trance whenever the name South Wellfleet is mentioned.

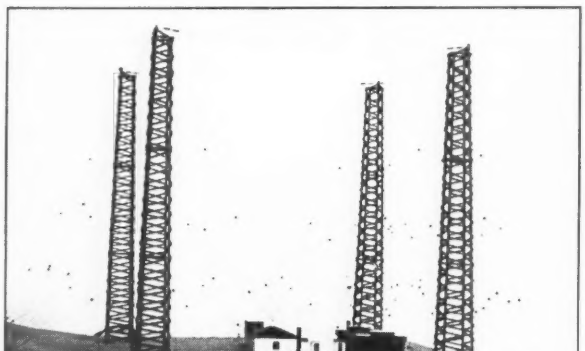
Here at W2EXM, fearing that some day my memory might fail me, some months ago I decided to recreate the old station in miniature as a small monument to the glorious past of wireless telegraphy, symbolized quite perfectly by "CC," "MCC," or "WCC," depending upon which phase of the station's existence you wish to refer. The model is to the scale of one-sixteenth of an inch to the foot, and in a sense is somewhat chronologically composite.

The antenna is that of the initial arrangement in that it is an inverted pyramid terminating at the lead-in insulator on the roof of the transmitting house, while the sand cliff edge is close to the outer towers as of 1916. The outer guys are shown "close-hauled" when they had to be moved in as the ocean eroded the bank. Under the "sand" in the model is housed a small spark transmitter. (The sand, by the way, is the real thing right from the station site, powdered down to somewhat near scale.) The Ford coil vibrator of the rig is adjusted to about 240 cycles, with the gap right in the transmitting house so that when in operation the station looks quite like the prototype did, with the spark shining out through the windows dancing out across the sand.

I knew the old station quite well, so that, by various visits over the years, photos taken from time to time and some recent measurements taken on the spot, I was well fortified with the necessary information to go to work. The guys do not spread out quite as far in some instances as they should, but then when a fellow lives in a city apartment he has to leave the wife some room for her own use!

It is not generally known that the first antenna at South Wellfleet was quite different from the arrangement with the four red towers which made WCC so famous. I have a photo here showing the original construction. It consisted of a circle of twenty military masts 200 feet high, from which hung an inverted cone of 200 wires gathered together at the roof of the transmitting house in a fashion similar to that later used with the pyramidal array. These masts were carried away during a bad nor'easter before the station began operation, and the four towers were erected to replace them.

Among my souvenirs is one of the first "r.f." insulators used at Wellfleet. Two 24-inch hard rubber tubes were passed over a two-inch manila line with a snug fit. The tubes are separated by a few inches on the line and then sealed against the weather with sulphur where the line passes out of the tubes. This kept the line within the tubes dry and provided insulation, and did not weaken the mechanical strength of the line at all. I imagine it was quite a tricky idea in insulators in 1903.



W2EXM's scale model of famous old WCC.

Incidentally, that block of concrete you show sliding off to the ocean is the base of one of the outer towers and not the powerhouse foundation.

There are quite a few of us less vocal oldtimers tucked away here and there but still interested in the game, and most of them are on the air. You may have heard of the Morse net some of us have, much to the distress of many hams who do not know the old code. We are W1CQR, W8CBI, W2JGA, W2FG, myself (W2EXM) and W1ZE when he can get time. You have to know Morse and have had at least 30 years in the game to join up. Hi! What a gang of reactionaries, to be sure, but it brings the past

up to the present for us and we have a good time withal. . . .

— Fred A. Parsons, W2EXM

Damariscotta, Me.

Editor, *QST:*

We've been trying to tell you for years that you can't enjoy soup without salt, washing without soap, romance without love and ham radio without *QST* — and, by golly, you can't enjoy *QST* without a sprinkling of stories like "Wireless Cape Cod."

Perhaps there isn't much left of the foundations of old WCC, but there are enough memories to patch the hot place for four miles. In reading Irving's article, those of us who know him realize how much more he could have told. It's safe to say that old WCC did more to polish up the code-copying ability of all hams that were in World War I than anything else. Who will ever forget the homemade loading coils you switched in to load up the old loose-coupler to 1500 and start off with that old familiar preamble to the Marconi-Debeg Press?

Thinking of this veteran old station is like recalling a dear friend and all the pleasant memories. When World War I got going, this "old friend" had become aged and wrinkled. His joints creaked and he couldn't keep up with the youngsters with their improved efficiency, and so he was attended by old Dr. Navy Department. A part of my duties as executive officer as the great Bar Harbor Naval Radio station, about 1919, was attending to various matters concerning radio stations in the First Naval District. One day a letter came from Headquarters relative to the old Marconi Station at Wellfleet, Cape Cod. It advised that we should send a group of men to see if there was any apparatus that could be used and to dismantle the station. In other words the "doctor" had prescribed that the poor old fellow be put out of his misery. Forgetting all other matters, I sat there, looking at that order. All the romance of those days gone by, came back to mind. Here in my hand was a paper that directed me to destroy this grand old station. An impulse of rebellion came to mind. I almost felt like saying: "Who dares strike my dear old friend?" Then I realized that there he stood, old and feeble, his mission in life completed. He really was a pathetic old fellow, and perhaps it was best to put him out of his misery.

When the necessary action was taken and papers executed to send a group of our men to attend to laying this old friend "to rest," I sat there for some time, looking at the papers which were a definite death warrant. I called in Chief Bill Woods and informed him of the matter and in due time he took his small group of men, and they proceeded to Cape Cod and to South Wellfleet. When they returned, the old Marconi Wireless Station WCC was no more.

Farewell, old friend, your duty done.
How much you helped us, every one.
No note will ever sound to me
Like that old "grunt" of WCC.

— H. W. Castner, W1IIE

INDEBTED

c/o Radio Station WAIT, Chicago, Ill.

Editor, *QST:*

Indebted? Yes, amateurs are indebted.

Indebted to the League, for outstanding service at all times and for *QST* and W1AW which now preserve unity within our ranks.

Indebted to the United States Government, for allowing the American brand of amateur radio to become a reality.

Indebted to each other, for the friendships and fraternalism growing from those ragchews which we will never forget.

Order No. 87 is but a temporary foreclosure upon a long-term loan. Now is the time when we must do our utmost to repay our loan with service to our country and financial support to our League.

— Robert W. Yeager, W9OAV

LET'S MAKE IT GO

10740 — 107 St., Edmonton, Alberta

Editor, *QST:*

Canadian Hams have been off the air for two and a half years now, and during that period there has been an alarming decrease in ARRL Membership among the Canadian Hams. Why? Well, granted that many hams are serving in the armed forces in various capacities, there still remains a large percentage, who, by reason of their work, physical condition, age, etc., are still resident in Canada. Are all these hams supporting the League? No! In fact, only a small percentage are, and the truth is that that percentage is growing smaller each year.

Why is membership falling off? The reason is quite apparent. Deprived of their prime hobby, the hams have branched out into various other hobbies and interest in ham radio has fallen off. As membership in the League expires, the hams take the attitude that they might just as well purchase their copy of *QST* on the newsstands.

Sure they can! But do those same hams ever stop to think that we cannot buy back our ham bands on the newsstands? Should the League, on account of non-support, be forced to fold up, who will we have to fight for us? Absolutely no one!

At various times new organizations have sprung up, both in Canada and the United States, with the avowed intention to relieve the ARRL of its so-called "monopoly" of ham radio, and

(Continued on page 58)

OPERATING NEWS

F. E. HANDY, W1BDI, Communications Manager **J. A. MOSKEY,** W1JMY, Asst. to the Coms. Mgr.

Defense Programs for the Amateur. Each individual radio amateur must find his place to serve in a responsible manner in the war effort. Through this participation the institution of amateur radio will do its part.

The use of the personnel and equipment of amateur radio in civilian defense is likely to constitute a major amateur contribution during the national emergency. Such use in supplementary radio facilities in each community only awaits DCB decisions and announcement of the specific mechanism of controls and safeguards that has been under study for some weeks. At this writing we are still QRX for Washington action which is momentarily expected. FCC action ordering the continued issuance of amateur operator licenses for all who pass the FCC exams is encouraging, paving the way for more specialists in radio in the services or in municipal defense. Before this paragraph is in print there may be news on the civilian defense front, and any affirmative plan or procedure going beyond the "Providence Plan" detailed in this and last *QST* will be rushed to ARRL field organization officials as soon as received.

Emergency Corps Registration for Civilian Defense. The constant ARRL goal has been to secure 100% Emergency Corps registrations to make it possible for each locality to have *the best facility possible* for any conceivable defense need. Not every amateur can expect to be part of defense set-ups of course. The needs have concrete dimensions, plans will cover specific points, fill communications gaps. Vital report centers or warden posts that have to have contact with the city control centers to report Air Raid Damage messages may be the important points. Such fixed points occur exceptionally at a ham shack, are likely to be in public buildings. For installation at strategic points designated, and pools of operators and gear we have hoped that the logical best selections might be made (when the time comes) from the ranks of Emergency-Corps-registered amateurs. Since OCD's booklet suggests conferences between OCD's Communications Officers and liaison with the amateur group leader (Emergency Coördinator) this, and specification of 2½-meter gear, still seem probable, if OCD-FCC-DCB find ways for needed safeguards without vital alterations in the initial organizing plans. To be ready: If as a licensed amateur operator you have never registered in ARRL's Emergency Corps, get the needed blanks from ARRL, or your Emergency Coördinator, or the nearest Western Union office, at once, and send 'em in!

Radio Training Of and By the Amateur. In September 1940, ARRL asked radio club groups to start operator-training. A number of clubs adopted excellent programs, made use of our Club Award Code Proficiency Certificates. At least one group, the Santa Clara County Amateur Radio Association, has run a continuing program to date. Now, in 1942, ARRL urges new training-in-radio programs for the duration. All individuals who can assist in training others in radio technique will be helping the nation to meet growing needs for radio specialists for armed service and for civilian shortages! There should be continued and unceasing efforts (1) on code instruction, and through arranging (2) radio theory or technical classes. The training need is a subject for planned attack, not for passive measures, in each community where some sort of training in radio is not going forward!

ARRL has prepared for Code Instructors a set of 17 Code Lessons covering sending and reception, with definite objectives or goals for the student in each part of the lesson material. Numerous clubs are starting on code instruction courses — and the information will be sent gratis (a) for inspection and return, or (b) for use in any serious code practice group.

ARRL also has a Radio Course Outline with suggested demonstrations to assist in planning radio theoretical courses. In every case where such a course has been announced, two or three times as many interested persons have registered for the studies as initially expected. It is a signal service to the individual as well as the nation to assist those bound for the services to become radio specialists. Besides fulfilling an urgent need of the services, many skilled radio men will be required to keep civilian radio plants and operating agencies properly manned. There is the practical goal of an amateur operator's license, government recognition for those adequately skilled. If group instruction is confined to code, the ARRL Club Code Proficiency award will facilitate certification of the progress actually made following tests by those in charge of instruction. The new "defense edition" *Handbook* has a whole chapter in code learning written for the student who has home study requirements. The whole text is a lucid to-the-point manual dedicated to the basic

theory-and-code training of men for all branches of the radio field. A practical radio theory course based on the new text, shorn of confusing constructional material, has been outlined for instructors planning courses.

Our Honor Roll. With some pride in the steady accomplishment and progress made since the start of the war in Defense Training programs, we present in this issue the first Honor Roll. All Clubs or Associations maintaining a code instruction program for beginning students are listed, with an additional designation of those maintaining courses in theory. The list may be used also as a guide by persons in the indicated localities seeking instruction. Many readers will be familiar with the BPL which was one type of honor roll to credit individual self-training of operators through the handling of message traffic. The new Honor Roll is aimed at crediting amateur radio with the defense training efforts put forward, and will, like the BPL, be based on monthly reports to SCMs from those groups making instruction possible.

WANTED: More local Defense Training Programs, either Code Instruction or Radio Theory courses. Ask ARRL for information about such courses, if you are in a position to get something started in your club, or independently in places having no active club or training program. Anything made to be used and not used is wasted. Radio knowledge must be perfected and extended. That is the constant aim of every true amateur. But radio knowledge must be passed along to others to multiply its power ten-fold (and one hundred-fold) for the electronic needs of the hour. This month our wish is to appeal to groups and individuals capable of conducting code or code-and-theory classes to roll up the sleeves and do this needed radio training job. ARRL has prepared the best helps possible for Radio Training. Let us help you to help others along the radio highway! Drop us a line to-day if you can get a class organized.

— F. E. H.

—···—

BRIEFS

Several hundred QSL cards from KC4USC, the U. S. Antarctic Expedition Snow Cruiser, addressed to amateurs worked have recently been forwarded via Hq. to the various U. S. District QSL Managers. If you worked the Snow Cruiser in the fall of 1940 there may be a card for you in the batch. An envelope filed with your QSL Manager in accordance with the usual rules will bring your card. Any W9 card may be obtained by writing ARRL Hq., enclosing a self-addressed stamped return envelope and mentioning the purpose in writing. The addresses for KC4USA and KC4USB correspondence were given in December, 1941, *QST*, page 57.

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The "Code School of the Air" is conducted each Monday evening at 6:30 and 10:15 P.M. EWT by the World-Wide Broadcasting Foundation. Listen to WRUS on 6040 and WRUL on 9700 kc. for code instruction especially suitable for use by beginners. The program is also useful to amateurs interested in maintaining their code copying ability.

Honor Roll

The American Radio Relay League War Training Program

The maintenance of listings in this column depends on submission of reports from month to month stating the continuance of code and/or theory classes. Only radio clubs and institutions of learning engaged in a program of defense radio training are eligible for the Honor Roll. Those groups listed with an asterisk teach both code and theory. Others conduct only code classes.

Advance Radio Club, Jonesboro, La.
Aerial Radio Club, Akron, Ohio.
Binghamton Amateur Radio Association, Binghamton, N. Y.
Butte-Anaconda Radio Club, Butte, Mont.
Charlotte Amateur Radio Club, Charlotte, N. C.
Civilian Air Reserve Monitor and Relay System, Toledo, Ohio.
Columbus Amateur Radio Association, Columbus, Ohio.
***Culver Military Academy, Culver, Ind.**
Downers Grove High School Radio Club, Downers Grove, Ill.
East High School Radio Class, Erie, Pa.
Electric City Radio Club, Great Falls, Mont.
Elkins Kiwanis Club, Elkins, W. Va.
Enid Amateur Radio Club, Enid, Okla.
Fort Wayne Radio Club, Fort Wayne, Ind.
Galveston Amateur Radio Club, Galveston, Texas.
Grant County Amateur Defense Organization, Marion, Ind.
Hannibal Amateur Radio Club, Hannibal, Mo.
Heart of America Radio Club, Kansas City.
Indianapolis Radio Club, Inc., Indianapolis.
Irvington High School Radio Club, Irvington, N. J.
Jackson County Amateur Radio Club, Jackson, Minn.
Jersey Shore Amateur Radio Association, Long Branch, N. J.
Joliet Amateur Radio Society, Lockport, Ill.
Lowell Radio Operators Club, Lowell, Mass.
Nashville Society of Licensed Radio Amateurs, Nashville, Tenn.
Northern Minnesota Amateur Radio Association, Unit One, Bemidji, Minn.
***Oklahoma City Amateur Radio Club, Oklahoma City, Okla.**
Pasadena Short Wave Club, Pasadena, Calif.
Piqua Radio Club, Piqua, Ohio.
Radio Club of Arizona, Phoenix, Ariz.
Richmond Amateur Radio Association, Richmond, Ind.
Sioux Falls Radio Club, Sioux Falls, S. Dak.
Tennessee Valley Radio Amateurs, Knoxville, Tenn.
The T-9 Society, Ocean Grove, N. J.
Vermont Academy, Saxton River, Vt.
Walnut Hills High School Radio Club, Cincinnati, Ohio.
Westerly Radio Association, Westerly, R. I.
Western Maryland Amateur Radio Club, Cumberland, Md.
Whittier Experimental Association, Whittier, Calif.

Providence Plan Efficient in First Test

THE "Providence Plan" for emergency communication coverage of the city was given its first test on February 16th. From the Radio Control Room at City Hall, Providence, R. I., Capt. Perry Briggs, W1BGF, contacted ten stations located throughout the city in forty-five seconds. This test was informal. The results were highly satisfactory as to efficiency, and further tests are planned simulating actual emergencies.

The personnel making up this new Police Amateur organization is headed by Rev. Charles J. Mahoney, W1BBA, and consists of twenty-seven other local amateurs who have been sworn into the Providence Police Department. Still others are due to be sworn in as additional personnel to operate the ten stations throughout the city. Much of the equipment being used is that of local amateurs who have donated, lent or sold it to the city for use in the emergency setup.

Here's how it works in Providence. The control station is at City Hall, and controls ten stations — one at Police Headquarters, one at fire alarm headquarters, and eight others centrally located in each of eight sectors of the city. Each sector station will have portable "walkie-talkie" gear by which a patrol member can report damage in his sector to his sector station, which in turn reports to the control station. Although such portable gear was not available for each of the sector stations for this test, George Korper, W1MKK, was sent out with one from headquarters and reported from various places in the vicinity. Four of the sector stations were able to hear his reports, while others reported him unheard. Korper, incidentally, recently donated practically the whole contents of his ham shack for use as an emergency control station to be set up at headquarters in case something should go wrong with the regular equipment. Two of the operators at WEAN have been sworn in to monitor all signals during drills and tests.

Two towns adjacent to Providence are organizing similar systems to go into operation as soon as arrangements can be completed. They will be licensed under special "X" calls (the Providence call is W1XVI) after preliminary construction and organization have been completed. Interested observers at the recent Providence test were the police chiefs of Warwick and East Providence, a radio technician of the Warwick Police Department, and the president of the East Providence Radio Amateurs Association.

Amateurs who have been sworn into the Providence Police Department and who are taking part in the work are: Director, W1BBA; Acting Captain, W1BGF; Acting Lieutenant, W1JP; Acting Clerk, W1LYE; Acting Sergeants, W1EJ, W1KUZ, W1INU, W1KKE, W1JEZ, W1JXA, W1HJB, W1LYE, W1MQY, W1GR; Radio Patrolmen, W1EZW, W1HEH, W1DDY, W1LU, W1LNK, W1MLF, W1EI, W1NCA, W1KYP, W1FTO, W1MKK, W1CMG, W1CBX, W1CMY, W1CNJ, W1NBH, W1EJD.

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BRIEFS

Since publication of press schedules in the January and February issues of *QST* we have received many inquiries regarding the meaning of GCT. The letters stand for Greenwich Civil Time which in practice is exactly the same as GMT or Greenwich Mean Time.

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Have you WACC (Worked All California Counties)? The Oakland Radio Club offers an attractive certificate to any station that can prove contact with every county in California. Rules were published along with a reproduction of the award on page 65 of October, 1941, *QST*. Why not look through that pile of QSL cards on hand? Perhaps you can qualify. The following have, to date, received their WACC certificates: W6DHS, W6ITH, W6IWS, W6MVK, W6OUE, W6PBV, W6RWW.

ARTICLE CONTEST

The article by Mr. Harvey B. Conover, W4FDT, wins the CD article contest prize this month. *We invite entries for this monthly contest.* Regarding subject matter, we suggest that you tell about what activity you find most interesting in amateur radio. Here you will find an almost limitless variety of subjects. Perhaps you would like to write on working for code proficiency, Emergency Corps planning, working on radio club committees, organizing or running a radio club, organizing local communications by wired-wireless, light beams, supersonic sound, induction, etc., or some other subject near to your heart.

Each month we will print the most interesting and valuable article received. Please mark your contribution "for the CD contest." Prize winners may select a bound *Handbook*, *QST* Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads, or any other combination of ARRL supplies of equivalent value. Try your luck!

QSL Swapping Time

BY HARVEY B. CONOVER, W4FDT*

SINCE we can no longer QSO, handle traffic, rag chew, work DX, have contests or Field Days, some scheme naturally will have to be devised from time to time to keep up the enthusiasm of the amateurs, especially the younger set, lest the old spirit die. We still have the fond remembrances and the hope that some day, and in some way, we will return to the air. Of course many will retain their enthusiasm and will still be loyal and support ARRL, and without hesitation I might say that I am one. To bring amateur radio back in its full glory, after the war, we must keep up our interest and enthusiasm, and stick together now more, not less, than we did when we all had rigs on the air.

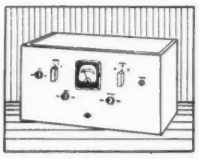
How? Well, there is still wired wireless; light beam transmission; and possibility of limited use of the ultra-highs. Technical radio is blossoming, not dying. We can still build, experiment, tinker. The only thing we cannot do is operate. We cannot put a signal on the air and renew all the old friendships we used to have by that medium.

There is even a solution to that. Why wouldn't this be a good time for everyone to catch up on his QSLing? QSL's have always held a warm spot in amateurs' hearts. No matter how many an amateur might have, or how many he might have collected from DX stations, he still appreciates QSL's. I do, and I don't deny it. Last year I had the pleasure of visiting one of the outstanding hams of the nation. He has countless thousands of QSL's. While I was there the mail arrived with some cards, and he was just as enthused over them as he was over his first. I talked at length with him about QSL's. He admitted that they were the backbone of hamdom.

Many of us have dismantled our transmitters and antennas, stored them away in the attic or cellar for the duration; some of us have sold or are trying to sell our equipment, writing "finis" temporarily to amateur activities. And yet, despite all the cleaning up and getting things settled, a great many of us still owe QSL's to countless numbers of hams we have contacted over the air; and many of those contacted owe us cards.

How about WAS and WAC awards? Do you have yours? Perhaps you have worked all states, but haven't received cards from all of them. Now would be a good time to ship one of your cards to each of the missing states. Response? I made a test a month ago, mailing forty-five cards, five cards

(*Continued on page 73*)



THESE days when all sorts of amateur gear are being adapted to serve new defense purposes, we wish to point out that the NSM Modulator has great possibilities as a public address amplifier. With a microphone and suitable speakers, it serves the same purposes as a megaphone for calling and giving instructions though its range and clarity put it in a class by itself. Its capabilities begin where the megaphone's end. The peculiar fitness of the NSM for this job lies in its automatic volume compression circuit. This circuit was originally designed to permit high modulation levels without danger of overmodulation. With minor changes this same circuit provides a high level signal for loud-speakers without danger of blasting. In our experience, this is a big help. When a microphone is used by a group of people with different speaking habits and with no previous microphone experience, some sort of monitoring is essential. An automatic device will do this job better than a manually operated control because it gives consistent results and is always on the job.

The other features of the NSM also fit the specifications for a good public address amplifier. It has an undistorted output of 30 watts and is entirely self-contained. A four position tone control cuts highs or lows, or both, or leaves intact the normal range of 50 to 10,000 cycles. There are two input circuits, one of which provides ample gain for any of the commonly used microphones.

In adapting the NSM for use with loud-speakers, the principal change is in the volume compression circuit. This circuit is, in effect, a delayed AVC. In a transmitter, the delay voltage is taken from the Class C plate supply, so that any change in plate voltage will automatically cause a corresponding adjustment in the modulation level. For use with speakers, where there is no Class C plate supply, the delay voltage can be obtained from the regular plate supply of the NSM through a suitable resistance network. The actual change is very simple, and we will send specific instructions on request.

It is, of course, also necessary to provide an impedance match. The NSM is designed for a load of 1500 Ohms. In many cases, a series parallel arrangement of the speakers can be used to obtain this value. A matching transformer can also be used of course, but if the speakers are located some distance from the transformer do not use too low an impedance (such as voice coils in parallel), for the high current at low voltage will waste a lot of power because of the voltage drop in the leads.

CALVIN HADLOCK

WWV Schedules

THE standard frequency service of the National Bureau of Standards station WWV has been extended to include another carrier frequency (15 megacycles). Temporary equipment is still in use while a new transmitting station is being built. The broadcast is continuous at all times day and night from 1-kilowatt transmitters, and carries the standard musical pitch and other features. The radio frequencies are:

5 megacycles (= 5000 kilocycles = 5,000,000 cycles) per second
15 megacycles (= 15,000 kilocycles = 15,000,000 cycles) per second.

The standard musical pitch carried by the broadcasts is the frequency 440 cycles per second, corresponding to A above middle C. In addition there is a pulse every second, heard as a faint tick each second when listening to the 440 cycles. The pulse lasts 0.005 second, and provides an accurate time interval for purposes of physical measurements.

The 440-cycle tone is interrupted every five minutes for one minute in order to give the station announcement and to provide an interval for the checking of radio measurements based on the standard radio frequency. The announcement is the station call letters (WWV) in telegraphic code (dots and dashes).

The accuracy on the 5- and 15-megacycle frequencies, and of the 440-cycle standard pitch as transmitted, is better than a part in 10,000,000. Transmission effects in the medium (Doppler effect, etc.) may result in slight fluctuations in the 440-cycle frequency as received at a particu-

(*Continued on page 56*)

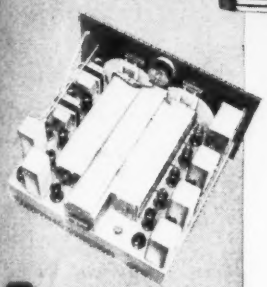
Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

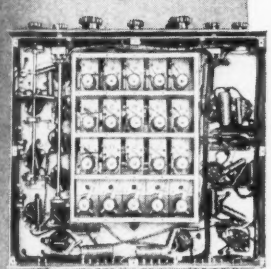
Lt. H. Atthill, G8CV, Farnham, Surrey, Eng.
Melvin Bacon, W6NWG, Oceanside, Calif.
J. Milton Bayes, W8BZY, Columbus, Ohio
Walter Eugene Brothers, jr., W4EKR, Hendersonville, N. C.
Lt. Frank Clark (C.S.G.), W6DHS, Emeryville, Calif.
W. A. Hendry, VE5WH, Victoria, B. C.
Lt.-Col. William Herbert Murphy, U.S.S.C., Dayton, Ohio
F./O. Murray D. Orr, VK3OR, Kerang, Vic.
William Coy Redwine, ex-W5SY, Ballinger, Tex.
Harry J. Rohman, W2BLV, Ramsey, N. J.
Peter Seath, G4FI, London, England
Herbert B. Shaw, W6EPU, Burbank, Calif.
Harold Richard Whaley, KF6OQS, Howland Is.

Commercial performance!

SERIES "200"



SUPER PRO



THE "Super-Pro" has, for years, been widely used in commercial services where performance must be "tops" and unvarying from day to day. Every "Super-Pro" is built for continuous duty, maximum stability, and high sensitivity with a minimum of background noise. That is why professional operators prefer "Super-Pro" receivers. The new "Series 200" Super-Pro with its improved noise limiter, adjustable "S" meter, and variable selectivity crystal filter has set a new high in receiver performance. Other important features include two R.F. stages, three variable selectivity I.F. stages, etc., all described in detail in a 16-page technical bulletin available on request at your dealer's or direct from factory.

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424 West 33d St., N. Y. City

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Address.....

City.....State.....

Canadian Office:
41 West Ave. No.,
Hamilton, Ont.

HAMMARLUND

(*Continued from page 54*)

lar place; the average frequency received is, however, as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.000,001 second. The 1-minute, 4-minute, and 5-minute intervals, synchronized with the seconds pulses and marked by the beginning and ending of the announcement periods, are accurate to a part in 10,000,000. The beginnings of the announcement periods are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods; this adjustment does not have the extreme accuracy of the time intervals, but is within a small fraction of a second.

The service from the temporary transmitters will continue for some months. It will be continuous except for such breakdowns as may possibly occur because of the use of temporary apparatus. As rapidly as possible the Bureau is establishing a new station to provide more fully than in the past standard frequencies reliably receivable at all times throughout the country and adjacent areas.

★ BOOK REVIEWS ★

Mathematics for Electricians and Radiomen, by Nelson M. Cooke. McGraw-Hill Book Company, New York. 604 pages, 6 x 9. Price, $4.50.

Here is a text written especially for technicians in the electrical and radio fields, utterly practical in viewpoint, and tying mathematics intimately to the everyday electrical problems which that science can be called upon to solve. One has only to glance through the pages to realize that such a book has been needed for a long time, and further inspection shows that it appears to meet that need in very comprehensive style.

Beginning with elementary algebra, the subject matter includes quadratic equations, logarithms, trigonometry, elementary plane vectors, and vector algebra. As the principles of each division are expounded their application to practical problems is shown, together with such electrical theory as is necessary to make the applications clearly understandable. A very important feature of the book is the large number of problems for the student to work out; answers are given separately for checking the work. Knowledge of arithmetical operations is the only prerequisite for study of the text.

The author, a Chief Radio Electrician in the U. S. Navy, is an instructor in the Radio Matériel School, Naval Research Laboratory; the present volume is the result of many years experience in teaching the subject. The presentation is such that difficulties in home study should be negligible.

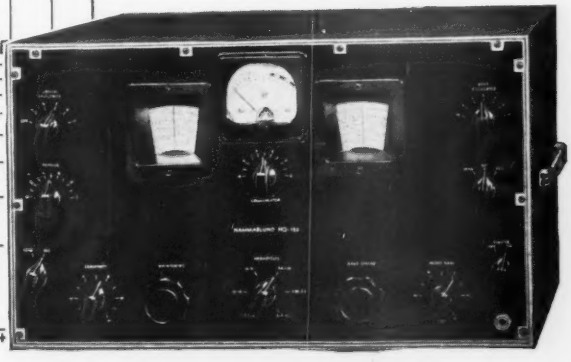
— *G. G.*

Principles of Electron Tubes by Herbert J. Reich. McGraw-Hill Book Co., New York. 398 pages, 6 x 9. Price, $3.50.

In one sense this is not a new book, since it is, in the main, an abridged version of the same author's well-known "Theory and Applications of Electron Tubes." It has been prepared for use in electronics courses intended for students who do not expect to specialize in communication, hence do

(*Continued on page 58*)

HQ-120-X
variable
CRYSTAL FILTER
for
PHONE OR CW
DX



THE VARIABLE SELECTIVITY crystal filter used in the "HQ-120-X" is an exclusive Hammarlund development and will be found only in Hammarlund receivers. This crystal filter is unlike all others in that an entirely different principle is employed. This new system, originally developed in the Hammarlund laboratories, permits perfect control of selectivity and allows the operator to adjust the crystal filter circuit to conform with practically any given set of operating conditions. The actual selectivity characteristic for each position of the 6-point switch is shown in the illustration. By selecting the proper position of the switch, the operator is assured of the maximum fidelity obtainable without interference from other stations. The output of the crystal filter remains constant throughout its selectivity range, the response curve is smooth, it is easy to adjust, and there is absolutely no interlocking of the controls. If you are interested in DX, phone or CW, try an "HQ-120-X" and note the smooth, unfailing performance of the crystal filter. You will also find the phone bands not half as crowded as they seem.

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PRECISION PRODUCTS FOR BETTER RADIO

HAMMARLUND

(*Continued from page 66*)

not have need for the detailed treatment of tube applications which is a feature of the larger volume. Consequently the treatment is, as the title indicates, largely confined to principles.

Lest this explanation of the purpose of the text give the impression that the present volume is less useful to those primarily interested in communication than the larger "Theory and Applications," it should be added that, in the present reviewer's opinion, the abridgment has produced a text which in many ways is more suitable for general study. The many side issues of specialized applications are deleted, leaving the main principles that much more strongly emphasized. In brief outline, the text covers the physics of the electron, thermionic emission, high-vacuum tubes (with analysis and circuits), analysis and design of amplifiers, modulation and detection, oscillators, glow and arc-discharge tubes, light-sensitive tubes, power supply, and tube instruments. Each chapter is accompanied by a set of problems (answers are given for those studying at home) and a selected bibliography of published material on the particular subject treated in that chapter.

"Principles of Electron Tubes" is an excellent introductory text — introductory in the sense that it provides a sound basis for more detailed study in the various fields of applied electronics. Intended for use in college courses, it assumes that the reader is equipped with college-grade mathematical knowledge.

— *G. G.*

Correspondence

(*Continued from page 49*)

each and every one of these organizations has been doomed to failure. Where are they now? Where will they be when we really need someone to "come to bat" for us?

As I see it, our only hope is in the ARRL. If we don't continue to support the League now, how can we survive? To wait until Peace once again encircles this war-torn old world of ours may be too late. We've just *got* to keep the League going, and it's up to the individual to get behind it to the last man as soon as possible.

I speak from the Canadian standpoint, but the same remarks apply equally well to the U. S. A. today. It's the duty of every League member to see to it that every ham in his community is approached on the question. Let's make it go!

— *W. W. Butchart, VE4LQ*

HANDS ACROSS THE SEA—1942

92 Chairborough Rd. High Wycombe,
Buckinghamshire, England

Editor, *QST:*

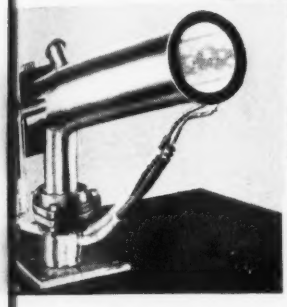
For the second time in its history, amateur radio has been closed down in your country through the exigencies of war, and, together, our countries are fighting the bitterest struggle in history.

Events will prove the value of the amateur in active service, as has been evident this side when numbers of enthusiastic and fully trained volunteers were instantly available at the outbreak of hostilities. In addition, the war effort has been strengthened by hundreds of technicians who owe to amateur radio their keenness and ability to help their country on the home front.

We in this country look to your great organization to foster the cause of amateur radio during the war, and side by side with RSGB and BERU,

(*Continued on page 60*)

Filament Emission Makes the Modern World Go Around



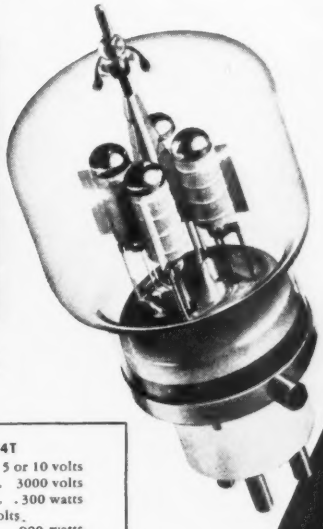
Close observation of the flow of electrons from a heated filament is made possible with this Electron Microscope. This instrument, designed and constructed in the Eimac laboratories, virtually gives a motion picture projection of the electron movement.

Before filaments are sealed into the triode they are heated in a temporary vacuum where they undergo their first emission test. Thus faulty filaments may be weeded out without further processing.

THE life of radio communications hangs by a tiny thread of filament wire. If the steady flow of electrons from the vacuum tube filaments ceases, the transmitter is off the air no matter how excellent the other components may be performing. To assure peak emission under the most severe operation conditions, many exacting tests are conducted during the process of manufacture.

Above is an Eimac technician checking an Eimac tube on the Peak Emission Tester. This device, designed and constructed in the Eimac laboratories, measures the flow of electrons emitted from the completed tube. Of a long series of filament tests conducted at various stages of manufacture, this test is the final. Other important controls are illustrated at left.

From beginning to end, Eimac tubes are designed and constructed to give vastly superior performance. The proof that they do is made clear by the fact that Eimac tubes enjoy first choice in the minds of leading radio engineers throughout the world.



EIMAC 304T

Filament Voltage	5 or 10 volts
Plate Voltage (D.C.)	3000 volts
Plate Dissipation	300 watts
Power Output 3000 volts at 75% eff.	900 watts

Follow the leaders to . . .

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(*Continued from page 58*)

hasten the resumption of activities afterwards. You may be sure of continued support from this side of the Atlantic. We shall still look forward to the regular arrival of *QST*, and will not grumble if the subject matter is somewhat modified due to circumstances, so "keep cracking."

In conclusion, should any ham on active service in this country find himself in this part of England, he is assured of a warm welcome at the above QRA.

— *K. W. Harbridge, G2KH*

On the Ultra Highs

(*Continued from page 57*)

Springfield on 224 Mc., with a pair of 304-B's and a "steerable" Vee beam. This was a non-visual path of 25 miles or more, and the first reception of Ross' signals at W1HDQ was a tremendous surprise to both ends of the circuit! Work between the two remained a cross-band (56–224 Mc.) affair, as the generation of a signal of sufficient strength to accomplish the return trip was beyond the capabilities of W1HDQ in those days.

Another long-time worker on 1¼ is Al Winchell, W1AIY. Blessed with a good location on Southington Mountain, near Waterbury, Conn., W1AIY was one of the earliest stations to be active on 56 Mc. back in 1931. By 1935, DX on Five was old stuff for Al and he began experimentation with 224-Mc. gear, in an attempt to work Hull at West Hartford. This contact never came about but it resulted in equipment for 1¼ being put to an interesting use. The oscillator shown in the accompanying photo was installed in Al's workshop. Being something of a meteorologist as well as a ham, Al rigged up an anemometer with a gear-reduction keying device. This was so arranged that it keyed a 1000-cycle tone modulator once per minute for each mile per hour of wind velocity. Thus when Al wanted the wind velocity he turned on the 1¼-meter receiver in his home and counted the "beeps" from the rig across the street.

At 224 Mc. and higher, equipment, of necessity, is simplicity itself. The parts needed will be lying around any amateur station, doing nothing, these days. For a starter we should have a superregenerative detector, a pair of Lecher wires, an possibly a reference oscillator using some small receiving tube. With these, we can go on to conduct an endless variety of experiments, none of which will be in violation of the close-down order. Working with radio reduced to its lowest terms, we can all of us learn many things that should make us better hams when we get back to such things as two-way communication.

Strays

Bill French, W2NYC, is located in N. Y. C.

W2JND lives at 73 Static Avenue.


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112 Mc. Pack Set

(*Continued from page 28*)

the variable condensers. C_7 consists of two 0.002-μfd. condensers mounted alongside RFC_3. It was considered advisable to use a shielded wire between the audio transformer and RFC_3, inasmuch as this lead must pass through the r.f. fields of the tuned circuits.

There are several reasons why the wiring of this unit deserves considerable care. In the first place, it is impossible to make some of the leads as short as we should like to see them, because of the mechanical layout. Leads that are longer than necessary will add considerable inductance to the circuits and on the transmitter side it will be difficult to secure the desired high-C combination. Long leads in the receiver section will cause the tuning condenser to act as though it were connected across only part of the coil and will give a band-spread effect that reduces the tuning range. It is therefore evident that when really short leads cannot be obtained the possible effect of each lead should be studied carefully before a finished connection is made.

There is nothing special about the d.c. wiring; it is only necessary that the wires to the batteries be long enough to reach from the unit to the batteries with a little to spare. A little extra length is convenient when the unit is being assembled in the knapsack. Plate and filament leads are equipped with battery plugs at one end and are connected to S_4 at the other end. The bias battery lead is connected to a lug strip mounted at the far end of the send-receive switch and the negative voltage lead connects to a lug-strip mounted on the frame of C_1.

The Antenna

An inexpensive automobile antenna rod makes a satisfactory antenna. In our case the rod was cut to a length of 38 inches. The optimum length should be determined by making field-strength measurements, since the length of the lead between the base of the antenna and the switch must be considered as part of the antenna. For this reason each constructor should experiment with his installation; most units will not be exact duplicates of the original, and therefore the optimum antenna length probably will be different.

Several schemes were tried for mounting the antenna, with the following system finally being selected as being the most suitable: A banana plug equipped with a 6–32 machine screw head was soldered into a jack-type feed-through insulator having a top section ⅛-inch long. The bottom of the antenna was then tapped to fit a 6–32 screw. This arrangement provides a connection which is satisfactory both electrically and mechanically. It also permits removal of the rod when the set is not in operation.

Testing and Operation

For testing, the unit should be connected to a battery supply and the headset and microphone plugged into their respective jacks. The antenna condensers should be set at minimum capac-

(*Continued on page 64*)

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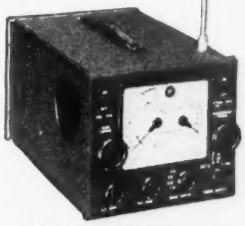

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(*Continued from page 62*)

ity and the send-receive switch thrown to the "receive" position. The superregenerative hiss should be heard when the power switch is turned on. If the hiss is not heard, it is suggested that the constructor experiment with the values of the grid-leak resistor, R_1, and the by-pass condenser, C_7; both of these components play an important part in the operation of the receiver and it is possible that the suggested values will not be optimum in other circuits having slightly different characteristics. The wiring also should be checked in the event of unsuccessful operation.

After the receiver has been made to superregenerate, it is advisable to try reversing the connections to the filament battery; changing the battery leads will change the grid bias slightly and this change should be evident in the form of increased or decreased output. If the receiver howls or growls, the value of C_7 is not correct.

With superregeneration normal, the receiver tuning range may be adjusted to cover the 112-Mc. band. This is done by changing the turn spacing of the coil until the center of the band falls at mid-dial, when the tuned circuit should cover just a bit more than the total width of the band. The antenna coupling also should be adjusted at this time, since it is necessary to realign the receiver during the antenna adjustment because the effects of antenna loading will shift the receiver tuning range. The coupling should be adjusted to give maximum signal strength consistent with smooth regeneration. Automobile ignition noise may be used in lieu of a regular signal.

Little difficulty may be expected with the unit switched to the "transmit" position. However, the tank circuit may need some adjustment so that the C will be as high as possible. The coil should be pruned until the transmitter tunes to 112 Mc. with C_2 set at nearly maximum capacity. More output will be obtained with less capacity in use but the stability will suffer accordingly. A 15,000-ohm grid leak seems to be best for the 1Q5GT, but other values of resistance should be tried if the circuit does not oscillate smoothly at first trial. The circuit will stand a good deal of loading and C_4 usually can be set at full capacity, but it should be backed off a bit if full capacity does prevent oscillation.

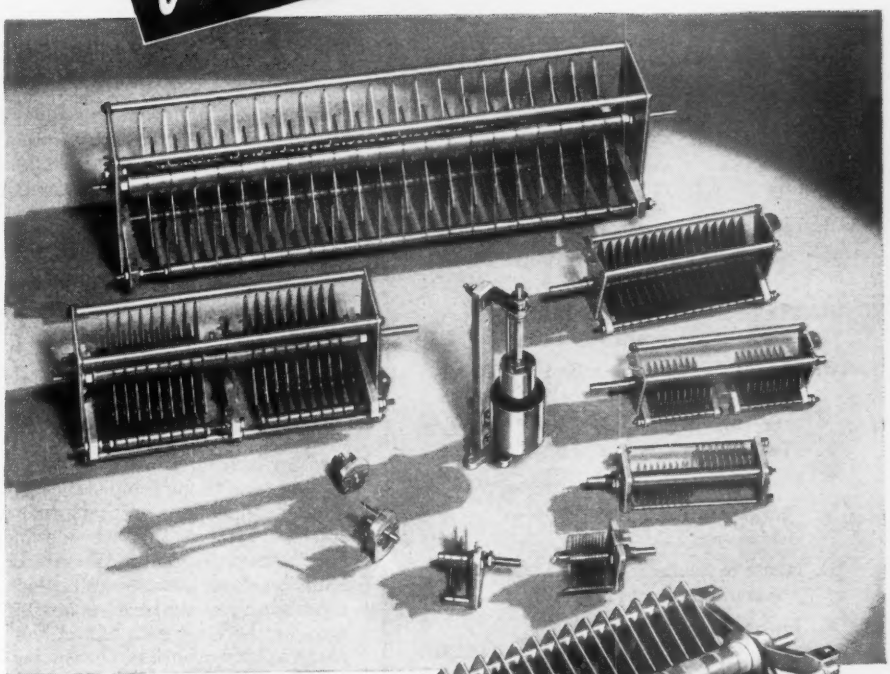
In actual operation, it has been found that the pack set does a little more than had been expected. Although built primarily for the purpose of providing communication in such situations as between roof-top and ground, between one building and the next, from the sidewalk to a mobile unit located a few hundred feet away, etc., field tests showed that we could cover more than three good-sized city blocks — with plenty of sock left at that distance.

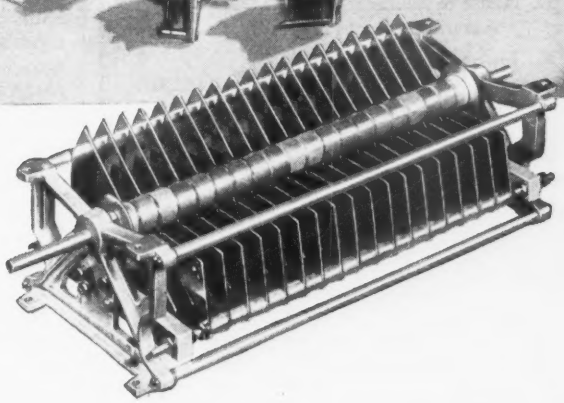
—···—

Strays

Two students of Central Catholic High School of San Antonio took ham exams three weeks apart, one in San Antonio and the other in Dallas. The first drew W5KLO, the second W5KMO.

JOHNSON *for condensers*





Although 100% of Johnson's production has been strictly for National Defense for several months, no attempt has been made to capitalize on this angle in advertising. It is being mentioned now only as an explanation of why a few orders were not shipped promptly. Johnson is operating three shifts and producing close to ten times as many parts as a few months ago.

Regardless of the need, if its variable condensers Johnson has the answer. Pictured in order of size are types K, J, G, H, F, E, D and C. Type B, at the bottom, is available in spacings up to ¾ inch and the big type A up to 1½ inches. Type N neutralizing condenser, shown in the center is furnished in several sizes and gas filled (pressure type) are also available in several sizes.

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The Field That Stays at Home

(Continued from page 33)

the inductance in millihenries and Q that of the coil (50–100 for ordinary r.f. chokes, 100–200 for honeycomb coils and solenoids, 150–300 for good powdered-iron core coils).

For maximum gain the operating frequency should be chosen so that the coil tunes to resonance with minimum tuning capacity. Thorough shielding and by-passing of each stage is recommended as high-gain multi-stage amplifiers of this type are more than a little inclined to instability unless carefully handled.

On Registering

And that about winds up this first report on the subject. It is earnestly hoped that each and every one interested in the use of the induction field for communication, remote control or other purposes will coöperate by registering in Project D (see Experimenter's Section, this issue), and supplying notes on equipment and tests.

As we said before, it's an interesting field! Will we meet you there?

Experimenter's Section

(Continued from page 41)

member hearing a watch tick for over 3½ miles.

"It seems to me the distance between the two ground connections on that test was a matter of 1000 or 1500 feet. With the improved audio apparatus on hand at most amateur stations, and a much greater audio output, it seems to me that considerable could be done along these lines. As soon as the frost gets out of the ground, I am contemplating continuing with these experiments. I even have hopes of being able to talk up to Pelham, N. H., by this method." — *Irving Vermilya, W1IDY*

This preliminary work looks inspiring, and we think it certainly warrants a place on our list of projects. So, we'll call it Project G, and you fellows who want to work on it can file your reports with the Editor of the Experimenter's Section until someone takes over the group leadership.

Providence Radio Patrol

(Continued from page 15)

which is located in the control room of station WEAN. A frequency standard of design approved by the FCC has been set up, controlled by four crystals ground to the frequencies authorized by the Commission for the use of station W1XVI. Radio Patrolmen Harry H. Tilley and Gilbert W. Johnson of the engineering staff of WEAN have been appointed monitoring officers and give frequency checks on every transmitter whenever there is a carrier on the air from any of the stations, fixed or movable.

(Continued on page 70)

NEW ABBOTT WT-5 *SUPER POWER* PORTABLE TRANSMITTER RECEIVER FOR 2½ METER OPERATION

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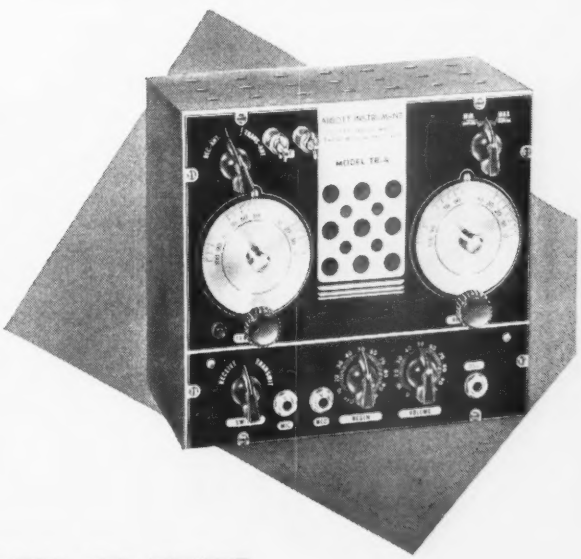
ABBOTT TR-4
TRANSMITTER RECEIVER FOR 2½ METERS . . .



A compact, efficient unit, designed for either fixed station or mobile operation. Transmitter and receiver sections are completely separated. The 5-inch PM speaker is self-contained. Single interconnected switch permits use of a common antenna for both transmitter and receiver. The TR-4 requires a 6-volt battery or 110 volt, 60 cycle AC power supply. Receiver radiation is necessarily reduced to a minimum.

● FREQUENCY: 112 to 116 MC. ● RANGE: Varying from 5 to 75 miles, depending upon terrain. Contacts up to 150 miles have been completed in field tests ● TUBES USED: One each of Hytron HY-615, Hytron HY-75, 7F7, 6V6 or 6L6 ● MICROPHONE: Any good single button microphone.

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Station Activities

CENTRAL DIVISION

ILLINOIS — SCM, Mrs. Carrie Jones, W9ILH — The State Communications Coördinating Committee met at Chicago, Jan. 28th. Gov. Green has appealed to DCB to reactivate carefully selected amateurs under strict regulations. The present plan is for amateurs to furnish communications for Municipal Police and link this network with the State Police Radio System. Col. Gowenlock, Coördinator of all law enforcement agencies within the State, has suggested that all Sheriffs and Chiefs of Police contact amateurs in their districts so that they may become more familiar with what services the amateurs might perform when reactivated. These agencies desiring further information have been advised to contact the SCM. An Emergency Coördinator is needed for each county, so step up, fellows, if your county does not have a representative. IUE and ENY left for Great Lakes, Feb. 2nd. No reports received this month. To keep this space don't forget the 16th. — W9ILH.

INDIANA — SCM, Harry B. Miller, W9AB — The Calumet Area hams are doing their organizing as a group, instead of by individual cities. This seems like a fine idea as the cities' boundaries can be told only by the sign posts and needs for communication will likewise overlap. W9EGQ and W9HNH are coördinators in this area, and are assisted by some of the best men in each field — u.h.f., l.f. 'phone, l.f. c.w., etc. EZ is in charge of communications for the local corps at Culver. MFD writes to say he knows news will be scarce (you're cookin' with gas now, Elmer) and that he is operating in an army net at Meridian. He sends 73 to the Hoosier gang and says that the experience he got with QIN last winter is certainly coming in handy now. The Indianapolis club, according to YMV, is holding up nicely, although many of the younger members seem to come up missing from time to time. New club is the Grant County Amateur Radio Defense Association with headquarters at Marion. MTZ says the club is sponsoring code and technical classes, building u.h.f. equipment, etc. Smitty has almost all the gang enrolled in AEC. HUV says his u.h.f. oscillator is so good it worries him. It loads up from 15 m.a. no load to 40 m.a. full load. Wish we had the same cause for worry. NXU is taking ground school work at Maxwell Field. CKY was married Feb. 14th. Nice valentine, Bob. UNS spent a week in bed with flu, but is recovering nicely. ZYK got his HY 615 and 75, and has his rig ready to test. HKP is now a code instructor at Fort Sill. He just left Mishawaka a few weeks ago. Somebody must appreciate a ham's worth. FB John. LFU has been called to active duty. YRR is teaching in the radio classes at Notre Dame. The course is in radio theory, and is tentatively set at 15 weeks. We understand there has been an unexpectedly large attendance at these classes. IWN is now in the Signal Corps. QAN and YCF, also in the Signal Corps, are located at Washington, D. C. SVU is now at Fort Monmouth. DET is proud father of Rita Jean, weight 8 pounds, born December 30th. FB, OM. DGA is in Cincinnati as an inspector for the Navy. The Fort Wayne Radio Club is sponsoring a code class every Friday night, starting at 7 P.M., at the club rooms, 610½ So. Clinton St. All interested in learning the code are welcome.

MICHIGAN — SCM, Harold C. Bird, W8DPE — It is gratifying to receive so many reports from the gang in the old manner. Michigan Eights: W8UTC got WAS after war was declared. He received confirmation of a station worked prior to the shut down order. Coördinator W8AIZ reports the following: "Held meeting of local amateurs to talk over local defense set-up and had navy man on hand to solicit enlistments. Have code and theory class at Fordson High School on Tuesday and Thursday nights, and an enrollment of 54 pupils. Several have gone down for ham tickets. An Asst. EC is checking the boys locally and have just started on new district allotted to me." RYP is the only ham in his section of the country, but is coöperating all he can, under the circumstances. MYG, Coördinator at Lincoln Park, is working on registration of the boys in his zone, has mailed out 90 blanks and questionnaires to get as much information as possible. NQ, Mt. Clemens Coördinator, is working on communications in Civilian Defense. The gang have about seven 112-Mc. transceivers finished now. SSY is working on new receivers to be installed on latest type planes. HKT is still roving the high seas. He received the bull at Panama, says he is glad to see the gang still sticking together. NXT rebuilt teleplex. URM gets kick out of handling traffic around the table at club meetings. FX would like to see wired wireless take a place in the ham world. UGR completed 112-Mc. rig and is now building 3.5/7-Mc. rig in one unit. PYP reports that St. Joseph High School has emergency rigs all set up and ready to go if needed. RJC is doing the same as all the rest of the good hams, just standing by ready to go to it if they want us. CMP has ready to go several receivers, transmitters, wavemeters and Lecher wires, all for 112 Mc. TMK has built transmitter for 112 Mc. and is now getting set for the modulation unit. IAE reports three hams in Greenville who are behind any efforts that are being put forth by the SCM. They are conducting radio school and have an attendance of 35 pupils. UXS says whatever you find on high frequencies to copy on mill, even if it does not make sense, is good practice. EGT is working on u.h.f. equipment to be ready when they say the word. CYH was all set with defense council papers when the shut down came. KPL copies press for practice. 73, Hal.

OHIO — SCM, E. H. Gibbs, W8AQ — New EC's appointed this month are: W8WKN, Piqua; LEK, Portsmouth; RRZ, Toledo. Despite the complete ban on all operating activity, several groups are going ahead with the planned program for u.h.f. building, code classes and continued meetings. Coöperation with the OCD is general and clarification of the amateurs' part is anxiously awaited by all. Dayton has 190 registered for code classes through coöperation with the local schools. Piqua Radio Club has remodeled their club house and has started code classes with 20 enrolled. Civilian Air Reserve Monitoring and Relay System of Toledo became an affiliated ARRL Club. Cuyahoga Radio Assn., Cleveland, elected following officers for the coming year: DS, pres.; AOK vice-pres.; OTT, secy.; EBJ, treas. Elyria has 16 enrolled in code class. Fostoria emergency group is having two meetings a month, and the last one was addressed by three Navy men, one of whom was Central Division Director Dosland, now stationed at Toledo. We regret to report the death of Milt Bayes, W8BZY. Milt was one of the old timers and a mainstay in ham affairs in Columbus. Ohio State Univ. is presenting a course in radio in two parts of 16 weeks each. Further information may be obtained by writing Prof. H. E. Nold, 214 Lord Hall, O.S.U. More reports for our Section report in *QST* are invited. What is your gang doing these days? Code classes (190 registered) have been started in coöperation with Dayton Schools. Senior high school students, 19 years old or under only are being trained this semester.

WISCONSIN — SCM, Walter W. Wallace, W9EYH — This is my first report as your SCM. W9UIT retires after four years. Al deserves a vote of thanks from us all for his fine work. DJC instructs code class at local radio club. QKN now has Class A and finished quarter kw. final. FHA has plan started to train women operators. SYT is now in charge of NYA radio school at Milwaukee and has several emergency rigs under construction. UFX sends fine report of activities in Madison area and has many new applicants for AEC. HZS, WCW and FVX are experimenting with wired wireless. HMO built low-freq. converter for his super to be used in experimenting with wired wireless. Who will be the first to QSO over the a.c. lines? Because of the pressure of defense work, GLX is forced to resign as EC for the Kenosha area. Please keep your SCM informed of activities and plans of hams in your vicinity. Your monthly reports are needed during this closedown more than ever before. 73.

DAKOTA DIVISION

SOUTH DAKOTA — SCM, Ernest C. Mohler, W9ADJ — The Aberdeen Club has a new Abbott TR4 and Katolight plant. Club members who have 112-Mc. rigs are: W9ZWL, YQR, EOJ and ISF. Club members are also holding group classes for improving code speed, operating procedure and copying on the mill. ZWL has a code class of college students who have enlisted in the Naval Reserve. OPS is the proud owner of a Class A ticket. Incidentally, Bill is only 15 years old and has a right to be proud! 73, Clyde.

NORTHERN MINNESOTA — SCM, Armond D. Brattland, W9FUZ — Code and theory classes are the order of the day, and it is learned that classes are being conducted in practically every town in Minnesota, where there are a few c.w. operators remaining who have not been drafted into the armed services. In several instances all the amateurs

have gone into service and, there being local defense force units, the demand is strong for code instructors. To cover such situation, it is planned to try out making up a complete course of instruction on phonograph records. At Bemidji several students drive in from neighboring towns, a distance of 25 to 30 miles, showing the spirit of which good hams are made. It is learned that VVA has a good thrifty class on the way at Willmar. Likewise they are doing their bit at Glenwood. At the Twin Cities HCC, HFF, BHY and others have taken on regular weekly classes. DPU at Crookston sends photographs of classes there, and reports going OK. KRG, president of the unit at International Falls, says the class is thriving well, as does QCP at Coleraine. Prospects are for another class of such unit at Grand Rapids. Considerable building of 112-Mc. equipment is reported, and GRH of Arrow-Head gang at Duluth says they are still busy there. OPA finished his u.h.f. gear, including receiver which DEJ constructed; the latter may be at Gallups Island by this time, where he will meet a number of the Minnesota gang, including KET of Park Rapids, who writes he is getting plenty of code practice and beginning to like the place more as time goes along. He says it's a "ham's paradise" as far as FB equipment is concerned. Three reports this month, gang! Shall try to keep some kind of a column going even if only one report is received, or there are any reports of activity about defense activities of a nature which will be of interest to amateurs. Before time for the next report, may I hear from you as to whether we should endeavor to hold space for our Section in *QST*, combine the activity reports with Southern Minn., making it a report of the state as a whole, or just call it "Kwits for the duration"? Please let me know your wishes and oblige. 73 — Andy.

MIDWEST DIVISION

IOWA — SCM, L. B. Vennard, W9PJR — In the Feb. issue we reported a list of the Iowa Emergency Coördinators. Here are the calls that should be added: W9MQY, TGK, NKC, DJY, QOQ, OJD, FNT, KLC, SCA, CCE, VKZ, POY. We have in all a total of 31 when the state should have 81! Why not get busy and nominate more. We need them. WTD has been named communication officer for the State Guard. They are ordering communications. It might mean something. Other EC's check and see what can be done. EFI and XYL have a class on theory and code, and hope to turn out a few radio operators for the Army and Navy. Thanks, "Conk"; that's doing your bit, and more of the gang should do likewise. QAQ reports a few 112-Mc. sets being built for home defense work. NMA and DHL have loaned some of their equipment to Graceland College for the course in radio there. More fellows could help by doing the same. SWD reports all members of his committee as trying to train operators for the government. VKZ bought an SX24. Everybody wants to know who is going to hold a hamfest this spring, for a good rag-chew. How about it, fellows? The Burlington Club plans a hamfest for the purpose of discussing home defense communications, Home Guard, CAP and others, so if in the mood drop me a line. There will be no prizes. 73 and CUL, Les.

KANSAS — SCM, Alvin B. Unruh, W9AWP — W9RAT, EC for the Coffeyville vicinity, reports about a third of the amateur operators in that locality have already left to take part in military or defense work. TKF and QNQ are both with NCR. YLY is with War Dept., QZT at an air center, RIP and PXW with CAA in Iowa and Nebraska. GBA has a radio class of about 30 at Lawrence High School. NSB has radio classes at Haskell Indian Institute. Coördinator VBQ reports Lawrence hams had received reauthorization and were ready to go on 112 Mc. when new order came. FER reports QML is busy with pilot training classes. CKV and VEL built identical emergency rigs. VEL has new vibropack. PAH reports authorization was requested for Manhattan hams before the new order came through, with local defense officials anxious to have hams enrolled. OUU sends in the last traffic report. It was for Nov.-Dec. 7th and, believe it or not, the total was thirteen! Lieut. W. E. Miles, USN, gave a talk to amateurs and other interested radio men in Wichita, Feb. 20th. He explained opportunities available to qualified men in the Navy. KFH was sent to radar school, Washington, D. C., by the Navy. HSI, formerly with KFBI, has accepted civil service radio engineering position in Dayton, Ohio. PLN has RME 69, SX16 and Howard 436A. Two additional night classes in radio engineering were organized at Wichita University, under government-sponsored program carried on by extension division of K.U. It is reported over 110 are now enrolled. Emergency Coördinator TVU, Lakin, was visitor at the SCM's shack. He was in Wichita to take medical exam prior to induction for military service. He joins the EC honor roll with NOH, Marysville, BYV, Scott City and WXY, Hiawatha; the latter three are in the naval forces. NHB was elected vice-president of WARC to succeed WIN, who took new job as CAA communications inspector, with headquarters out of town. TFB moved to Wichita from Stockton. ODD of Indiana was a visitor at NHB. Topeka friends of GPR will be interested to know he is now employed in an aircraft factory in Wichita. BDX, formerly manager of Radiolab, is attending Navy radio school in Washington. VJT reports hams in Florence vicinity had a get-together, with various amateur gear on display. QSOs were limited to aural range, with the old-time gabfest enjoyed by all. JCY is rebuilding five-inch oscilloscope. According to letter received by QEF, AWC, former Wichitan, who is a navy civilian radio engineer at Honolulu, married a girl from the old home town of Sedalia, Mo., who likewise is located in Honolulu. Congratulations! In KVRC election, following Topeka hams are to be congratulated: President, ICV; vice-president, and treasurer, UCQ; secretary, ABX. ICV is member of Civil Air Patrol. CET was confined to bed by serious illness, but is improving. Remember, gang, we still like to receive news of general interest — most anything except what you use in the rig. Things not worth remembering: one of the antenna poles at W9AWP blew down! 73 — "Abie."

MISSOURI — Acting SCM, Wm. G. Skinker, W9AEJ — W9GBJ, who holds the oldest continuous ORS certificate in Mo., is anxious to keep his certificate valid. Lawrence County Coördinator KJC reports new operators are already being turned out by his code classes. Theory is also being taught. Nice going, gang. KPM is anxious to serve in the defense set-up, and may build up a h.f. station. NCD had an argument with some gearing and lost part of one finger, with repairs needed on two others. He didn't say how the gears reacted! Nevertheless, Arnold sent in his report, and says he is keeping in touch with officials as Clay County, E.C. The Kansas City gang want to include North K.C. in the Webster County organization. St. Louis and St. Louis County hams have organized and elected zone and township representatives, respectively. Yours truly, AEJ, has gone to Omaha, Nebr., to operate the army station WVU (as a civilian), but left the Section on such short notice decided it would be best to continue as Acting SCM, as a new one will soon be elected anyway. Mail should still be sent my old QTH. Because of an oversight, there was no formal announcement of the vacancy in QSR until this issue. Only two EC's sent in reports this month. Let's hear from the rest of you coördinators. It's part of your job, you know. 73 — Bill, W9AEJ.

The Month in Canada

It is surprising the amount of interest this Column is creating. The writer has received letters of appreciation from the four corners of the world; therefore, it is up to all of us to pass along as much news as we can possibly gather.

Don't forget, although our membership has fallen off to less than a quarter, the old "bible" is still on sale in many lands, and our boys on active service are still getting the odd copy. So make it as interesting as you can for them.

—*Alex Reid, VE2BE*

IN CASE you missed "The Month" last month (and we hope you did!) we apologetically report that its non-appearance was all a mistake. We won't go into the details — they involve delayed and wrongly-routed mail, etc. — because we know you're not interested in alibis, but we do promise that it won't happen again.

Anyway, you'll find the news that should have appeared last month duly included in the ample budget which follows.

(*Continued on page 72*)

Providence Radio Patrol

(Continued from page 66)

Technicians Being Recruited

Applications are now being received from the radio engineers, radio service and repair men of Providence for membership on the Patrol as technicians under a sergeant to maintain the equipment of the patrol and, in emergency, to maintain and repair any and all radio equipment of the Providence Police Department. The Bureau of Police has authorized the appointment of ten such technicians.

With these licenses and with the equipment of the Providence Police Department operated by members of the Department, it is now possible to give the radio coverage primarily sought by the CDO. In addition to this coverage, the City of Providence, through its Police Department, has launched experimentation in the possibilities of police radio on these ultrahigh police frequencies. Eventually it will give to the city a self-sufficient police radio system in the event of failure of the usual police system on lower frequencies, whether this failure be due to accident, disaster, or withdrawal of the lower frequency by the FCC.

Steps are now being taken to hold an examination so that all members of the Patrol will hold commercial-grade FCC licenses, at least of the restricted radiotelephone permit class. Many will be encouraged and aided in procuring the higher grade licenses. The Providence Police Mobile Patrol will, in this way, be able to give loyal, efficient and well-disciplined service to the City of Providence.

An All-Wave Converter

(Continued from page 12)

band with simultaneous settings of C_{DP} and C_{DS}. In a similar way, the other coil ranges are tuned and adjusted to overlap adjacent ranges, always using first the parallel trimmer to set the high-frequency limit of the range and the corresponding series condenser to fix the low-frequency end of the range. Unless outside signals are available, it may be necessary to use a local oscillator for setting the range limits. A calibrated oscillator will facilitate the job, but it is possible to do it with one not calibrated by adjusting the ranges to overlap. A minimum of overlap should be allowed if the maximum frequency range of the converter is to be obtained.

If the oscillator ranges are adjusted to those given in the tables and the L_2 coils made close to specified dimensions, it should be possible to peak the tuning of the mixer by adjustment of C_3.

With most antennas, a variable condenser of 100 to 200 $\mu\mu$fd. in series with the ground lead will give a material increase in signal strength at the low frequencies. As mentioned previously, bandspread tuning over a moderate range can be obtained by using the tuning control of the receiver to change the i.f. However, in resuming tuning of the converter, the receiver tuning should always be returned to the 2000-kc. setting.

(*Continued from page 69*)

MARITIME—VE1

From L. J. Fader, 1FQ:

I AM indebted to Miss Iris Chittick, VE1AYL, for the following data on the St. John, N. B., district:

The St. John Amateur Radio Club are still having meetings along with the occasional theatre party and bowling match. The gang there have met up with the odd G ham from the Old Country who happens to be in their city on ships. One they mention in particular is GM3RL, John Shaw. He is employed by the Marconi Co. and hails from Aberdeen, Scotland. His ship was bombed on its way to Canada last year and he spent eighteen weeks in the hospital with a broken leg and broken arm. John also suffered the loss of his right eye. He will, unfortunately, have a stiff leg for the rest of his life but otherwise they report him as being now OK. The Marconi Co. have guaranteed him a job for life, which seems a very nice attitude.

I ran across Bert Horne from Moncton, N. B., who was visiting Halifax for a few days during the Christmas week. He is the Radio Supt. of No. 10 Air Observation School at Chatham, N. B. He has a staff of ten men under him, including his brother Bill and J. B. Price, 1JG, who are classified as radio engineers at this school. Capt. Ed Terfry, 1CF, is one of the operators at this same school.

I enclose a few newspaper clippings about the exploits of one of the local gang, Doug Smith, 1FO. 1FO was one of the main instigators and backbone members of the local club. He was one of the pioneers of five-meter work in the Maritimes, and was also the local emergency coördinator for this part of the Maritimes. We regret very much the fate that has befallen him, and hope that there is a remote chance that he is safe and a prisoner of war, rather than a casualty.

1FN, who was one of the foremost DX men of the first VE district, is in the Old Country with the RCNVR as a lieutenant. 1JM and 1HK were recent visitors to their homes at Halifax, where they spent the Xmas leave with their parents. Also visiting the city for Xmas was 1HG. I had a 'phone call from G3GM, who is at the Eastern Passage Station of the RCAF. He is with the Fleet Air Arm.

Now that the U.S.A. has joined in the conflict, possibly there may be some of the W gang coming into our port here as ops, etc. I would appreciate their 'phoning me or getting in touch through any of the local service men's hostels. My 'phone number, for any who may be interested, is S.2981.

QUEBEC—VE2

From Lin Morris, 2CO:

2KM graduated from Bishops College and has now enlisted in the RCAF. Naval lieutenant 2DE came home from an eastern Canadian port on a month's leave and reports meeting 2KX there. 2CO met 2BU while skiing in the Laurentians. 5TD (ex-2CX) has been transferred from Kingston to Ottawa. 2LR and 2PI are in the McGill O.T.C. 2GE has been traveling around for the CBC. It is good to hear that 2HF's health has improved again. 2DR and 2EE are very busy in Ottawa. 2HO and 2GO are studying hard to pass Reserve Army tests. 2BK spends his leaves visiting his many Scottish and English relations. 2BO has been in Washington for some time. 2CJ, 2HI, 3AKO and 2CO were shown over No. 1 RCAF Wireless School by ex-5AG. 3UO and 3MB helped 2DU get his car out of a snowdrift on the latter's eventful trip home from Gananoque.

ONTARIO—VE3

From Len Mitchell, 3AZ:

(*January*) From Kirkland Lake comes news of the formation of a new radio club, the first to come to our attention since the close-down edict. This is particularly encouraging since so many other clubs are having difficulty carrying on. The Kirkland Amateur Radio League was formed in April, 1941, by a group of amateurs in the district who felt that some means should be found of keeping in contact with each other. At the time of writing the club numbers 17 members, 12 of whom were active amateurs when the war broke out. The others were preparing to get their tickets. The officers are as follows: president, 3PH; vice-president, 3ALT; and secretary-treasurer, Austin S. Murphy. The other licensed members include such well known calls as 3ALU, 3AWB, 3OD, 3PA, 3ALW, 3AGG, 3ARW, 3AZN, 3WI and W5GAZ, who happens to be in Kirkland Lake on important work in the mines. 3AZN is on active service with the RCAF overseas, and 3WI is on active service with the RCAF in Canada. Meetings of the club are held every third week in the members' homes, and equipment for code practice is provided. As the treasury builds up it is expected that further apparatus will be built.

3QB reports he is still alive and not in uniform, patiently waiting for the big day. He misses the stacks of QSL's he used to receive. He wishes to start a list of all amateurs killed on active service and claims 3UH has the honor of being the first to give up his life. 3UH, Horace Stark, of Carleton, went down in the Atlantic on a Canadian destroyer early in the war after having been rescued from the *Fraser*.

3SA, who was with the RAF, is in hospital in England, but unwounded. It is rumored he may soon be home. 3RK, who holds the rank of lieutenant in the RCN, is home on leave after having seen service on three or four continents. 3ACQ is also back from England due to a physical disability. 3FB is again back in Toronto. 3SG, who has been very active in the Reserve Army, has recently been promoted to the rank of company sergeant-major (Reserve Force). Recently G3WC, who is with the RAF, and W2FGO, who is in the U. S. Army Air Corps, dropped in to see 3SG and had a long chat which lasted till the wee small hours. Quite a colorful gathering! 3GI, who holds the rank of lieutenant with the RCN and who has seen 18 months service on a British cruiser, is back in Toronto. 3APA has been having considerable success with home-recording apparatus, and has made numerous recordings for private persons and from the air.

It is with regret we learn that 3ANT, Flying Officer Vincent Tapp, has been injured in a flying accident and is in hospital in England. At the time of writing all that is known is that his right leg has been amputated below the knee and that his right wrist is in a plaster cast, but that he is able to sit up in a wheel chair.

(*February*) 3FB, who joined the RCAF at the outbreak of war and who has recently returned to Canada after having seen service in England, has been promoted to the rank of Pilot Officer. 3KV, who has been with the RCAF in Montreal, was married last September and has since been promoted to the rank of Sergeant. 3LS, who has been with the RCAF over eighteen months, is at present located at Rockcliffe Station, Ottawa, and says he will sure be glad to get back on the air when the time comes. He often lies on his bunk and thinks of the good old days.

From Kirkland Lake comes word that 3ALW is at Wright Hargraves Mines doing radio research work, 3PH is looking after the new Police Radio in Kirkland Lake (which is one way of keeping on the air), and W5GAZ has returned from California where he spent Christmas with his parents.

ALBERTA—VE4

From W. W. Butchart, 4LQ:

(*December-January*) We have received several letters lately from readers of this column in which they praise our lowly efforts at news-gathering, all of which makes us feel that our work is not going unappreciated. Thanks a lot, fellows.

Once upon a time there was a ham, known to his fellow-hams as "Oscar the Flea" and some times referred to as 4RV. Yes, fellahs, "Oscar" is still amongst us. Stan wrote us the other day from Laird, Saskatchewan, at which point he is station agent for the CNR. All the 75-meter boys will remember Stan and his two-and-one-quarter watt peanut roaster. Remember the time he worked a VK down on 20 meters with the "heap"? Them was the days! Stan wants to know if 4DR is still around, and 4SL. How about it, fellahs?

4ADW is now in charge of the CATL Station, and finds that it takes up most of his time. VVJ's sister was married a week or so ago and 4EA "covered" the event with his camera. 4WH and 4AKK visited Mickey (4WY) in her new home at Sylvan Lake. 4ADD, now with the RCAF, expects to be posted to Saskatoon for flying training. 4AAD, 13th District Signal Officer, was in Edmonton presiding at the examinations of 4XE's Signalling School. 4QX, recently reported in this column as doing research work of a secret nature for the British Government, arrived home in Edmonton on December 22nd. He will be married before returning East.

(*Continued from page 52*)

to each of the nine call areas, with the following results in answers received: W1's, 100%; W2's, 100%; W3's, 100%; W4's, zero; W5's, 80%; W6's, 80%; W7's, 80%; W8's, 60%; W9's, 100%. Cards to foreign countries may not be delivered in some cases, but if they were, the foreign hams receiving them would probably be delighted to hear from you. The League still issues both WAS and WAC awards to those qualifying.

I have several hundred cards on hand, and if there is need for more to reply with, I will gladly have more printed. I am not after WAS. I have made WAS many times, but many amateurs can, in this period of limited activity, (1) get their confirmations up to date and (2) acquire the valued certificate. There are two large file cabinets filled with QSL's here at W4FDT. I should like to fill several more. With almost 8000 QSO's with at least 7000 different stations, there is much QSLing to be done to catch up. This station will answer any and all QSL's the day after receipt.

Now, if you fellows are game, give her a twirl; there's nothing to lose and everything to gain. These things may not keep things moving as fast for ARRL as the old activity, but it will go a long way toward helping. Other fellows are no doubt under the same impression. Let us continue our swapping of confirmations and keep our ham friendships through the written word while we're off. Get some cards off today!

*739 Looney Ave., Memphis, Tenn.

Morse Operating Opportunities

ALONG with the general shortages of radio operators and technicians we understand that there is a growing demand for skilled Morse operators. This may indicate an opportunity for radio amateurs that know both Continental and Morse, or for any who would like to brush up on the less familiar code. A.T. & T., or local telephone companies, may be able to advise on operating openings.

Morse is used in two fields, for handling official company information between telephone offices and for railroad dispatching where telephone or teletype are not available. A recent instance is cited where test room Morse operator vacancies required the services of an operator who had been 20 years retired. The increases in railroad traffic have necessitated the reopening overnight of many telegraph offices along the rail lines, so it is stated that almost every road in the country has need for qualified Morse operators. W9WWB sends the following notice with request that it be brought to the attention of amateurs that might be interested:

"The Southern Pacific Company is conducting a telegraph school at Oakland Pier where Morse telegraphy and station work is taught free of charge daily except Sunday and holidays, 9 A.M. to 4 P.M. and 7 P.M. to 9 P.M. For arrangements see Mr. G. A. Willis, Instructor, 'phone TE2121, local 4866. Applicants should be high school graduates, not be subject to draft for at least 8 months, have some business training and know how to operate a typewriter. Physical exam requires good color perception, and candidates must be age 18 by the time they finish the 6-to-8 month course. Pay rates for those employed include annual vacation and pass privileges, and effort is made to provide part time employment for students attending the school."

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BRIEFS

W2LMN calls our attention to the fact that the score of his Field Day group was omitted from the results published on page 39 of January *QST*. Using the call W2LMN/3 they operated near Vernon, N. J., on "FD" with six transmitters, all running under 30 watts input. The gang made 4050 points by having 281 QSOs. This score ties them with W9AYO/9 for fifth highest score among the non-club groups. The following participated: W2AVO, W2CMY, W2CNO, W2IIW, W2IQG, W2JT, W2LMN, W2MBS, W2MLW, W2NCY, W2NYY, W8RFP and W2LVF.

The Parkway Radio club FD station was incorrectly listed as W1IIM/1. The call used was W1HOB/1.

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W4EO's car marker bears the number 20–73. He was a DX hound before the blackout!

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in West Hartford on or before noon of the dates specified.

Due to resignations in the Colorado, Missouri, Iowa and Idaho Sections, nominating petitions are hereby solicited for the office of Section Communications Manager in these Sections, and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, Wednesday, April 15, 1942.

Section	*Closing Date*	*Present SCM*	*Present Term of Office Ends*
Montana	Apr. 1, 1942	R. Rex Roberts	Apr. 15, 1942
Indiana	Apr. 1, 1942	Harry B. Miller	Apr. 15, 1942
San Diego	Apr. 1, 1942	Louis A. Cartwright	Apr. 15, 1942
Philippines	Apr. 15, 1942	George L. Rickard	Oct. 15, 1938
Kentucky	Apr. 15, 1942	Darrell A. Downard	Apr. 15, 1940
Hawaii	Apr. 15, 1942	Francis T. Blatt	Feb. 28, 1941
New Mexico	Apr. 15, 1942	Dr. Hilton W. Gillett	Apr. 15, 1941
Sacramento Valley	Apr. 15, 1942	Vincent N. Feldhausen	June 15, 1941
Nevada	Apr. 15, 1942	Edward W. Heim	Nov. 1, 1941
Oklahoma	Apr. 15, 1942	R. W. Battern	Nov. 1, 1941
Eastern New York	Apr. 15, 1942	Robert E. Haight	Nov. 1, 1941
Western New York	Apr. 15, 1942	Fred Chichester	Dec. 6, 1941
Southern Texas	Apr. 15, 1942	Horace E. Biddy	Dec. 23, 1941
Colorado	Apr. 15, 1942	Carl C. Drumeller (resigned)	.....
Missouri	Apr. 15, 1942	Robert C. Morwood (resigned)	.....
Iowa	Apr. 15, 1942	Ray L. Martin (resigned)	.....
Idaho	Apr. 15, 1942	Clifford A. Jessup (resigned)	.....
South Dakota	May 1, 1942	E. C. Mohler	May 18, 1942
Alabama	May 15, 1942	James F. Thompson	May 22, 1942
Virginia	May 15, 1942	Frank S. Anderson	May 27, 1942
Alaska	June 1, 1942	James G. Sherry	June 14, 1942
Los Angeles	June 15, 1942	Ralph S. Click	July 1, 1942
Illinois	July 1, 1942	Mrs. Carrie Jones	July 11, 1942

1. You are hereby notified that an election for an A.R.R.L Section Communications Manager for the next two-year term of office is about to be held in each of these Sections in accordance with the provisions of the By-Laws.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list in alphabetical sequence the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.
38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the.....Section of the.....Division hereby nominate.....as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)

The candidates and five or more signers *must* be League members in good standing or the petition will be thrown out as invalid. *Each candidate must have been a licensed amateur operator for at least two years and similarly, a member of the League for at least one continuous year, immediately prior to his nomination or the petition will likewise be invalidated.* The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, but no member shall sign more than one.

4. Members are urged to take initiative immediately, filing petitions for the officials of each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

— *F. E. Handy, Communications Manager*

ELECTION RESULTS

In the Wisconsin Section of the Central Division, Mr. Walter Wallace, W9EYH, and Mr. Paul J. Kehl, W9GFL, were nominated. Mr. Wallace received 101 votes and Mr. Kehl received 78 votes. Mr. Wallace's term of office began February 10, 1942.

Sweepstakes Scores

(Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is Winner for that Section. . . . Asterisks denote stations not entered in contest, reporting to assure that stations they worked get credit. . . . The number of sections and number of stations worked by each participant are given following the score. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates power up to and including 100 watts (multiplier of 1.25), B indicates over 100 watts (multiplier of 1). . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Example of listings: W3BES 115165–62–744–A–39, or, Final Score 115165, number of sections 62, number of stations 744, power factor of 1.25, total operating time 39 hours.)

ATLANTIC DIVISION

E. Pennsylvania:

W3BES	115165–62–744–A–39
W3DGM	109198–62–705–A–40
W8OKC	83550–60–563–A–37
W3HFD	83235–62–537–A–33
W3FRY	77500–62–500–A–39
W3IKW	75330–62–486–A–40
W3BXE	69750–62–450–A–39
W3FLH	68150–58–470–A–37
W3JBC	66250–60–435–A–40
W3HXA	64170–62–414–A–39
W3CRW	62415–57–438–A–39
W3DVC	60619–61–399–A–40
W3DMQ	59523–58–412–A–40
W3CHH	58290–58–402–A–35
W3GHM	56788–59–388–A–35
W3GHD*	55490–62–360– – –
W3KT/3	48866–58–338–A–29
W8FDA	41663–55–305–A–38
W3IXN	40500–54–300–A–39
W3HUS	39684–54–301–A–27
W3CPS	38618–57–275–A–37
W5DBR/3	33381–49–278–A–30
W3GQW	31200–52–240–A–28
W3HCH	29925–42–288–A–33
W3FQG	24600–48–205–A–18
W3JN	24035–46–219–A–18
W3HLZ	23625–45–210–A–13
W3ILK	22260–48–186–A–26
W3AIZ	22140–41–218–A–40
W3DDX	21218–41–217–A–28
W3EWR	20655–45–230–B–31
W3JAK	20588–45–183–A–23
W3BUI	18515–46–161–A–27
W3GOW	13387–38–158–A–26
W3ADE	10736–44–122–B–15
W3HCC	10545–37–114–A–21
W3ZG	8890–28–127–A–14
W3GHW	7680–32– 96–A–14
W3CWQ	7215–26–111–A–16
W3JNQ	6435–18–143–A– –
W8OML	6370–28– 91–A–15
W3HHS	5808–23–101–A–25
W3HZV	5250–21–100–A–15
W3JSU	4658–23– 87–A–27
W3JUC	3905–22– 73–A–19
W8LAP	3105–23– 68–B–15
W3CDY	2875–23– 51–A–15
W3GTS	2668–23– 58–B– 5
W3CPV	2460–24– 41–A–10
W8VMF	2375–19– 50–A– 8
W3GRS	1760–16– 44–A– 5
W3JAC*	1400–20– 27–A–20
W3IEG*	1444–19– 39– – –
W3JKK	1154–13– 36–A–10
W3ENH	910–14– 26–A– 3
W3DFJ	780–12– 27–A– 8
W3IQO	708–12– 30–B– 8
W8TJU	650–13– 25–B– 6
W3HJE	550–11– 20–A– 3
W3HDN*	523–11– 19–A– 6

'Phone

W3BET	11352–43–133– –28
W3HQJ	2275–25– 46–B–11
W3FTS	338– 9– 15–A– 7
W8TJU	252– 9– 14–B– 6
W3IEG*	12– 2– 3– – –

Md.-Del.-D. C.:

W3GAU	83700–62–545–A–40
W3BTQ	68735–59–466–A–32
W3GJY	66450–60–443–A–40
W3DPA	59625–60–402–A–35
W3FSP	51371–57–361–A–38
W3IEN	40690–52–314–A–32
W3DRD	32400–54–240–A–24
W3JVJ	21973–47–188–A–24
W3FDJ	20100–50–202–B–30
W3JGJ	17640–42–168–A– –
W3JGK	16200–40–162–A–33
W5JVQ/3	10601–33–130–A–24
W3IJI	8737–29–121–A–25
W3GOL	3183–19– 67–A–13
W3AKR	2912–28– 55–B–13
W3JKO*	2580–24– 43–A– –
W3USA[1]	952–17– 28–B– 1
W3JTA	784– 8– 50–B–12
W8AQE/3*	400–10– 16– –
W3AVW	360–12– 15– –
W3WU	256– 8– 32–B– –
W3FGR	255– 6– 17–A– 9
W3CDQ[2]	64– 4– 8–B– 2

'Phone

W3EQK	10332–41–126–B–31
W3AQV/3	1680–21– 40–B– 6
W3HIQ	2– 1– 1– – –

So. New Jersey:

W3ITR	79650–59–540–A–35
W3HYT	76036–59–518–A–37
W2EQS/3	48230–52–376–A– –
W3HCA	11935–28–171–A–35
W3IMU	3500–14–100–A–20
W3BEI	2625–20– 53–A– 9
W3JAR	1659–21– 40–B–16
W3JBU	1085–14– 32–B– 7
W3JRG	225– 9– 13–B– 3

'Phone

W3HDJ	26136–54–242–B–34
W3CCO	13– 4– 7–B– 2

W. New York:

W8EUY	69031–59–468–A–40
W8DZC	61655–59–418–A–38
W8SSC	58212–57–412–A–38
W8EBR	49410–54–460–B–38
W8FLX	47188–54–370–A–39
W8NEY	24725–46–215–A–36
W8UVE	16001–51–129–A–29
W8TXB	13344–48–139–B–12
W8DTV	12650–46–111–A–27
W8TRG	8370–36– 93–A–22
W8OXH	2268–19– 50–A–16
W8DII	1725–23– 36–B– 4
W8VAM	1500–20– 30–A– 9
W8WIF	1200–12– 41–A–12
W8VUU	1733–21– 33–A–14
W8NY	919–15– 25–A– 6
W8OCY	293– 9– 13–A– 6
W8WEJ	200– 8– 10–A– 5
W8SFD*	168– 7– 9–A– 2
W8QHX	112– 7– 8–B– 3

'Phone

W8FMF	36410–55–331–B–40
W8ACY/8	9416–44–107– – –
W8PFJ	6448–42– 77–B– 7
W8UKZ	1248–16– 39–B–10
W8KWS	1020–17– 30–B– 5
W8RCK	700–14– 20–A– 2
W8RVM	381– 9– 17–A–10
W8MLM	40– 4– 5–B– 0
W8AKX*	8– 8– 2– – –

W. Pennsylvania:

W8NCJ	68600–56–490–A–40
W8IYI	35200–55–320–B–40

(*Continued from page 74*)

W8YA[3]	28407-51-280-B-30	W8RQN	3045-21- 58-A-12
W8IOY	28294-47-308-B-36	W8TWA	2904-23- 52-A-20
W8NUG	22038-41-215-A-31	W8HSN	1254-17- 32-A- 6
W8MIZ	15216-37-169-A-24	W8RIT*	920-20- 46-B- -
W8UWZ	14868-42-177-B-19	W8VMW	469-15- 25-B-11
W8SFV	12220-52- 94-A-18		
W8ZU	10760-41-106-A-27	*'Phone*	
W8USM	10175-37-113-A-19	W8MHD	5358-38- 71-B-16
W8UAP	9821-27-155-A-21	W8RBJ	1292-19- 34-B- 6
W8NWY	5643-33- 87-B-14	W8RAQ	972-18- 27- - -
W8LOR	4200-28- 60-A- 9	W8WFD	160- 8- 8-A- 2
W8SNX	4100-25- 83-B- 8	W8QJ	50- 4- 5-A- 7

CENTRAL DIVISION

Illinois:

W9GFF	95635-62-618-A-40	W9ECO	1568-11- 57-A-23
W9YFV	94550-61-620-A-40	W9TAL	83- 3- 22-A- -
W9FOI	90900-60-607-A-40	W9FNY*	64- 8- 8- - -
W9BRD	90051-61-591-A-37	W9YGW	52- 4- 7- - -
W9YWQ[4]	82800-60-552-A-40	W9RSS	50- 2- 10-A- 3
W9IHN	63510-58-440-A-40	W9TOJ*	1- 1- 1- - -
W9TH	43725-60-292-A-26		
W9MUX	42639-61-351-B-27	*Indiana:*	
W9NVW	38122-46-338-A-37	W9KBL	50243-58-353-A-40
W9GP	30068-57-211-A-17	W9NZZ	36623-57-258-A-23
W9LGU	29783-46-259-A-39	W9MKM	24840-48-207-A-39
W9AND*	25857-51-169-A-35	W9AMM	19000-50-193-B-20
W9TKN	25355-44-233-A-35	W9EGQ	15405-39-158-A-23
W9AMP	24750-55-225-B-28	W9SLZ	10984-39-160-A-34
W9AGM	24715-54-184-A-31	W9GOU	4500-30- 60-A- 9
W9VOQ	24120-48-201-A-15	W9DGA	1925-22- 35-A- 4
W9MYW	23460-46-208-A-32	W9ILU	720- 9- 32-A-14
W9MDK	18258-51-180-B- -	W9SWH*	96- 6- 8- - -
W9VLT	17483-42-168-A-32		
W9IVD	17458-43-204-V-31	*'Phone*	
W9CEO*	16200-45-182-B- -	W9GWL	24360-56-219-B-35
W9MHD	15803-43-147-A-18	W9BKJ	9576-38-126-B- -
W9EUV	14748-34-170-A-17	W9LTR	1260-12- 53-B-16
W9MFW	13038-35-150-A- -	W9BKH	455-13- 18-B- -
W9MEY	10500-35-125-A-30	W9ZWQ	2- 1- - - -
W9ECD	10395-33-128-A- -		
W9WJI	10250-40-106-A-30	*Kentucky:*	
W9MRQ	10197-33-164-B- -	W9FS	130883-63-831-A-39
W9JMG	9785-38-103-A-25	W9ZWK	60950-53-460-A-19
W9AQB	8920-32-112-A-14	W9GTR	35888-45-319-A-36
W9QBA	8460-36- 94-A-14	W9NAR	30680-52-300-B-36
W9IQT	7761-39-101-B-10	W9OMW	15269-35-175-A-31
W9RCJ	6743-29- 95-A- 8	W9FUP/9	3900-26- 61-A-16
W9NMY	6580-28- 95-A- 7	W9UTO	425-10- 17-A- -
W6LDJ/9[5]	6175-38- 65-A- -	W9NYW*	405-12- 14-A- -
W9MSX	5925-30- 80-A- 6		
W9LNQ	5800-29- 81-A-12	*'Phone*	
W9IBC	5530-28- 79-A- 6	W9YQN	51179-61-420-B-37
W9FVU	4568-21- 87-A-21	W9HPM	1008-18- 28-B-12
W9AUU	4560-24- 83-A-16	W9GZF	765-15- 26-B-10
W9TCK	3335-23- 59-A-17	W9LQA	660-11- 24-A- 9
W9JSV	3238-10-142-A-24		
W9ARM	2860-22- 52-A-12	*Michigan:*	
W9EBX	1700-17- 50-B-14	W8IFT	55460-59-504-B-38
W9HVZ	1620-18- 40-A-10	W8UKB	54890-55-507-B-40
W9FUY	1545-15- 53-B-17	W9INU	46475-55-343-A-28
W9ELZ*	1512-18- 42- - -	W8CFQ	30952-53-293-B-30
W9WIO	1463-13- 45-A- 9	W8NCB	27552-56-253-B-27
W9ZMK	1450-20- 29-A- -	W8SPF	25498-47-221-A-28
W9NOM	1279-11- 47-A- -	W8TWC	22654-47-241-B-21
W9KPC	1131-13- 44-B-10	W8NJC	21823-58-151-A-33
W9JSL	1041-17- 26-A-11	W8NWU	19502-49-199-B-18
W9BWN	900-12- 31-A-11	W8GP	15986-49-132-A-25
W9JTX	633-11- 23-A-12	W8UTC	15454-39-163-A-32
W9BAY	290- 8- 15-A- 8	W8UQR	13975-43-130-A-36
W9OSQ	245- 7- 14-A- 2	W8GSP	13455-45-151-B-37
W9QVE	234- 9- 13- - -	W8OQF	12100-40-121-A-12
W9TAL	225- 9- 10-A- -	W8SDR	10622-47-113-B-26
W9BIN	220- 8- 11-A- 4	W8VKU	9825-30-131-A-19
W9GSH	216- 9- 12-B- 4	W8TQA	6320-32- 80-A-19
W9JUM	213- 5- 17-A-13	W8DM	5200-26- 80-A-14
W9ERA	200- 8- 10-A- 2	W8OHO	4255-23- 74-A-19
W9TEB	175- 7- 10-A- 7	W8VWV	3000-24- 50-A-12
W9FXZ	108- 6- 9-B- 1	W8UXI	2115-18- 51-A-11
W9ECO	100- 5- 8-A- 3	W8UZC	1550-20- 33-A-10
W9KYX	63- 5- 5-A- 3	W8UFH	975-13- 30-A- 2
W9LTS	50- 4- 5-A- 2	W9RFJ/8	418-11- 19-B- 5
W9FKV*	20- 2- 4-A- 1	W8TZD	160- 8- 10- - -
		W8TKW	135- 6- 9-A- -
'Phone		W8UEY	34- 3- 5-A- 1
W9NDA	44730-63-355-B-38	W8UCG	23- 3- 3-A- 2
W9SZR/9	24708-58-218-B-38		
W9NGG	20240-44-187-A- -	*'Phone*	
W9OD	18240-48-190-B-30	W8NNF	31065-51-274-B-39
W9ENI	17250-50-138-A-26	W8QDU	29636-62-240-B-27
W9ZYL	12584-44-144-B-26	W8EMP	14612-52-281-B-24
W9CWP	8443-22-156-A-35	W8PYP	7344-36-103-B-16
W9BZT	5510-29- 95-B-16	W8CAT	5890-38- 78-B-22
W9QWM	5309-31- 69-A- -	W8SCU	5250-35- 76-B- -
W9MHD	3218-26- 50-A- 6	W8HRC	2565-19- 54-A-20
W9ICZ	3016-29- 52-B- 7		

To Our Readers

WHO ARE NOT A.R.R.L. MEMBERS

Application for Membership

AMERICAN RADIO RELAY LEAGUE

Administrative Headquarters: West Hartford, Conn., U. S. A.

.....194.....

AMERICAN RADIO RELAY LEAGUE,
West Hartford, Conn., U. S. A.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3.00 in foreign countries) in payment of one year's dues*, $1.25 of which is for a subscription to *QST* for the same period. Please begin my subscription with the..... issue.

The call of my station is.....

The class of my operator's license is.....

I belong to the following radio societies.....

.....

Send my Certificate of Membership ☐ or Membership Card ☐ (indicate which) to the address below:

Name .....

.....

.....

A bona fide interest in amateur radio is the only essential requirement but full voting membership is granted only to licensed radio amateurs of the United States and Canada. Therefore, if you have a license, please be sure to indicate it above.

[*The dues are $2.50 per year in the United States and Possessions. All other countries $3.00 per year.]

(*Continued from page 76*)

W9FOV	731-13- 23-A-15	
W8QBR	176- 8- 11-B- -	
W8VVD	149- 7- 9-A- 5	

Ohio:

W8JIN	102690-63-653-A-39
W8OFN	98439-61-649-A-40
W8HGW	95524-63-607-A-39
W8RSP	78300-58-540-A- -
W8UUW	72735-60-490-A-40
W8ROX	71025-60-480-A-40
W8SLH	67629-59-462-A-40
W8OYI	65048-59-441-A-36
W8BTI	63900-60-426-A-32
W8FGX	63278-59-435-A-32
W8SDN	57230-59-388-A-32
W8SMC	51410-53-402-A-38
W8BFB	43129-53-326-A-29
W8DAE	39806-55-293-A-35
W8RSW	38520-48-324-A-37
W8LFE	37912-56-339-B-28
W8SDD	31680-55-288-B- -
W8SUN	30745-55-282-B- -
W8BCE	28394-55-207-A-27
W8LCY	28178-51-221-A-27
W8KOL	27390-44-252-A-28
W8MGR	26895-44-247-A-30
W8QVK	23231-45-208-A-35
W8VAD	22586-46-246-B-37
W8NZI	22050-40-225-A-31
W8NDU	21471-51-218-B- -
W8UYL	21344-46-232-B-40
W8AL	19211-47-167-A-33
W8VVL	17888-43-210-B-22
W8BOJ	16380-44-153-A-12
W8VPR	16200-36-180-A- -
W8LOF	14740-44-134-A-15
W8BXC	13275-45-119-A-20
W8VUE	12640-32-173-A-28
W8LCO	12500-40-126-A-21
W8RN	10424-31-135-A-22
W8PBX	7808-32-122-B- -
W8BCJ	7120-28-116-A-15
W8MOH	6500-26-100-A-17
W8WHE	6450-30- 87-A-23
W8VLK	6038-35- 69-A-19
W8BUM	5780-34- 68-A-14
W8VLV	5231-27- 78-A- -
W8PCS	4940-38- 68-B-12
W8RJD	4015-22- 74-A-24
W8VHT/8	4030-26- 62-A- -
W8BKE	3818-23- 83-B-17
W8TLW	3388-28- 62-B-13
W8WEG	3250-26- 51-A-18
W8TDZ	2933-23- 51-A- -
W8GVL	2772-21- 66-B-19
W8UNA	1520-19- 32-A- 6
W8SIX	1440-16- 36-A- 7
W8LCA	1400-20- 37-B- 8
W8EDY	1211-17- 29-A- 3
W8SXQ	900- 9- 40-A- -
W8HS	715-13- 22-A- 6
W8UPB	450-10- 18-A- -
W8UVR	289- 7- 17-A- -
W8SSU	250-10- 10-A- 4
W8QEB	32- 4- 8-B- -
W8SQE	12- 2- 3-B- 1
W8TNB	10- 2- 2-A- 1

'Phone

W8PXP	23650-55-216-B-40
W8MXL	20856-44-237-B-33
W8NDN	16544-47-176-B- -
W8NCV	15275-47-166-B-34
W8GYR	13500-45-150-B-21
W8QAD	12596-47-134-B-24
W8RHG	11424-37-125-A-23
W8TRX	5904-36- 83-B-14
W8TPZ	4975-20-100-A- -
W8SXU	4012-30- 55-A- 9
W8VNG	3408-24- 71-B-18

W8JFC	3360-28- 51-A- 7
W8PNJ	2047-18- 47-A-17
W8AQ	1440-18- 32-A- 5
W8TQS	990-11- 45-B-11
W8PBX	600-12- 25-B- -
W8VMA	540- 9- 24-A-20
W8TEC	450- 9- 20-A- 6
W8SXQ	450-12- 15-A- -
W8VPA*	440-11- 20- - -
W8TLW	200-10- 10-B- 1
W8ATK	180- 5- 18-B- 8
W8LXP	126- 6- 11-B- 4
W8ELB	55- 2- 11-A- 9
W8CBI	36- 3- 6-B- -
W8VBA	6- 1- 3-B- 2

Wisconsin:

W9RQM	106330-62-688-A-40
W9DIR	104440-60-696-A-39
W9VDY	83570-61-550-A-39
W9UIT	65540-58-452-A-40
W9ZTO	56985-58-393-A-36
W9BSS	49075-52-378-A-36
W9JUE	43750-50-350-A-37
W9GIL	42000-60-280-A-31
W9EYH	41388-55-302-A-16
W9KZZ	29348-46-324-B-27
W9RH	27702-54-257-B-35
W9VWG	27562-49-227-A-40
W9KXK	20760-48-173-A-23
W8OYY/9	20563-47-178-A-26
W9ITJ	16763-45-149-A-17
W9BPR	10880-32-136-A-20
W9IRN	10170-36-114-A-19
W9CAS	10004-41-122-B-18
W9ONY	9610-31-125-A-23
W9GVL	9450-30-126-A-29
W9JBF	8960-32-112-A-19
W9HPZ	8740-38-119-B-33
W9WXD	8132-38-111-B-29
W9IDV	7718-34-114-B-34
W9IJB	7440-31- 96-A- -
W9VD	6882-37- 93-B-20
W9QYI	6859-31- 90-A-20
W9GQO	6750-27-100-A-26
W9SMP	5750-23-100-A- 7
W9VVZ	4940-26- 76-A-24
W9DTE	4094-25- 69-A-27
W9HMU	3840-24- 64-A-12
W9OVO	3132-27- 60-B- 7
W9OVD	3055-26- 47-A- -
W9LDK	2856-24- 60-B-14
W9RKP	2258-21- 43-A-11
W9SJF	1995-21- 38-A- 9
W9LUC	1980-22- 36-A- 7
W9LED	660-12- 22-A- 3
W9LAD	650-13- 20-A- 7
W9ZEY	352- 8- 22-B- 7
W9ILR	341- 7- 20-A-14
W9CCD	340- 8- 17-A- 3
W9VKC	210- 6- 14-A- 4
W9OEF	138- 5- 11-A-13
W9ANA	30- 3- 4-A- 2

'Phone

W9RBI	53680-61-353-A-39
W9KBT	6864-33-104-B-13
W9GLX	3983-27- 60-A- -
W9GSP	3045-29- 42-A-19
W9RNZ	2794-15- 75-A-22
W9UFX	2720-17- 64-A-13
W9CCD	2678-21- 51-A-22
W9NPK	1520-16- 38-A- 8
W9GAA	300- 5- 24-A- -
W9HEE	160- 4- 20-B- -
W9OUT	158- 7- 9-A- 1
W9TPO	98- 2- 20-A- 9
W9FZC	48- 4- 8- - -
W9EYH	23- 3- 3-A- 1
W9LWA	15- 1- 6-A- 3
W9HPZ	10- 1- 4-A- 2
W9YKE/9	2- 1- 1- - -

DAKOTA DIVISION

North Dakota:

W9OUH	5138-29- 71- -23

'Phone

W9YNX	4495-31- 76-B- 8

South Dakota:

W9WUU	28188-55-206-A-33
W9GLA	14850-45-132-A-38
W9BLK	11890-41-116-A-15
W9GCW	10080-36-112-A-24
W9YOB	2760-23- 48-A-14
W9ILL	2232-31- 73- - -
W9IIE	1890-21- 36-A- 9
W9SEB	425-10- 17-A- 3

'Phone

W9ADJ	21200-53-160-A-28
W9DIY	360-12- 30-B- 5

TEN YEARS PRACTICAL PROGRESS *IN ONE YEAR*

MANY hams have joined our armed forces. Others occupy civilian jobs essential to our war effort or are serving as instructors. Practically all the better rigs are being offered to the Allied Nations. The ham's creed of constant improvement and friendly helpfulness bears fruit in a host of skilled communications workers so sorely needed now. ● Thus, despite amateur radio's temporary restrictions, it is a priceless asset to this nation at war. ● AlSiMag steatite ceramic insulators are also restricted for private communications use. All the efforts of American Lava Corporation are now directed to war purposes. Newest developments are not made public these days. But we believe that the first, hard-driving year of all-out war will result in greater practical progress than would occur in ten ordinary years. ● When the day comes that you can once more sit at your rig and operate without restriction, you will find a vastly increased number of fellow radio amateurs. There will be new equipment to gladden your heart. And for that new equipment you will find AlSiMag insulation available in new forms and in better quality and workmanship than ever before.

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AMERICAN LAVA CORPORATION • CHATTANOOGA • TENNESSEE

(*Continued from page 78*)

No. Minnesota:

W9JRI	71765–62–463–A–40	
W9LAE	29640–52–230–A–39	
W9HQW	11375–35–131–A–15	
W9RZQ	10281–35–118–A–38	
W9ORT	7595–31– 98–A–22	
W9WUQ	7240–32– 92–A–28	
W9RIA	5340–30– 89–B–16	
W9AQU	2850–24– 49–A–17	
W9VT	820–13– 16–A– –	
W9ZSC	8– 2– 2– – –	

So. Minnesota:

W9VKF	78895–62–510–A–40
W9YXO	42694–55–312–A–25
W9JNC	29555–46–257–A–34
W9OBM	9225–41– 95–A–12
W9VIP	4400–32– 55–A–18
'Phone	
W9RVS	6336–37– 70–A–26
W9ZDM	408–12– 17– – –

DELTA DIVISION

Arkansas:

W5IWL/5	4858–29– 67–A–30
W5AQF	4270–28– 62–A–13
W5EGY	50– 5– 5–B– 1
'Phone	
W5EWD	22624–56–203–B–37
W5EGY	6232–38– 85–B–14
W5ELJ	585–13– 19–A–12

Louisiana:

W5KC	75335–61–494–A–40
W5CXQ	32064–48–342–B–31
W5IYL	26912–58–241–B–32
W5GBB	7920–33– 96–A–18
W5JKW	4930–29– 68–A–31
W5BI	4880–32– 61–A–13
W5ISF	3306–23– 60–A–11
W5KHR	2703–23– 49–A–17
W5JET	2329–23– 41–A–10
W5SU/5	297–11– 15– – –
W5IWY	245– 7– 13– – 2

'Phone

W5HNW	23715–51–233–B–33
W5IRO	22050–49–225–B–37

Mississippi:

W5HTL	19580–44–184–A–24
W5JDR	16287–43–154–A–28
W5GQA	2555–28– 38–A–14

Tennessee:

W9MHU/4	48575–58–350–A–38
W4PL	45260–62–366–B–37
W4FDT*	33020–52–255–A–25
W4HZI/4	19176–47–210–B–38
W4GVJ	8560–40–108–B–17
W4FLW	8190–35–118–B–22
W4DDJ	481–13– 20–B– 5
W4HXO	465–12– 16–A– 3
'Phone	
W4FLS	31565–59–269–B–38
W4DPS	3630–24– 64–A–11
W4GGR	3510–30– 59–B–14
W4DLK	1400–20– 35–B– 4

HUDSON DIVISION

E. New York:

W2MBS	64553–57–453–A–37
W2EWD	46550–56–339–A–39
W2NCG	37565–44–343–A–37
W2IZO	22610–38–239–A–29
W2LRZ	15604–47–166–B– –
W2OIQ	5808–23–101–A– –
W2OGE	2000–25– 40– – –
W2NJF	62– 5– 5–A– 1
'Phone	
W2NSD	5096–26– 98–B–22
W2OIQ	3825–30– 51–A– –
W2MEC	2940–30– 49–B–13
W2NJF	960–16– 31–B– 7

N. Y. C. & L. I.:

W2IOP	106446–61–718–A–40
W2LZR	73805–58–509–A–30
W2AYJ	53625–55–390–A–34
W2DXS	52290–56–388–A–40
W2DXL	47716–59–329–A–38
W2NDQ	35000–56–250–A–21
W2GGN	34330–47–292–A–36
W2KKU	33278–51–262–A–34
W2GP	25100–40–251–A–27
W2EYS*	20370–42–194–A– –
W2MZB	20090–49–164–A–18
W2FTX	19253–34–230–A–35
W2KZX	17330–47–153–A–24
W2AHC	15200–50–152–B–16
W2HXT	13428–41–131–A–16
W2LLE*	11400–57–100–B–23
W2EGG	11088–36–154–B–17
W2LIX	9685–26–144–A–14
W2LPJ	8925–34–105–A–12
W2KVL*	7935–23–138–A–18
W2LPA	7088–27–105–A–22
W2NVQ	6313–25–102–A–20
W2NNZ	6048–32–100–B–16
W2MOY	6000–24–100–A–12
W2DUS	5980–26– 93–A–15
W2MCI	4198–23– 75–A–16
W2HUG	3218–26– 50–A– 4
W2NWN	3180–20– 79–B–14
W2ANX	2948–22– 67–B–10
W2OBU	2565–18– 57–A–19
W2EC	2440–20– 61–B– 3
W2KXB	1920–16– 48–A– 6
W2BO	1870–17– 55– – –
W2CNC	1650–14– 50–A– –
W2NZE	1200–15– 32–A– 8
W2CJY	960–16– 24–A– 4
W2HSY	875–14– 25–A–10
W2CVO	787–15– 21–A– 8
W2CFS	735–14– 21–A– 3
W2NWX	624–12– 26– – –
W2JB	616–11– 28– – –
W2OAA	518– 9– 23–A– 7
W2KGE	200– 8– 14–B– 6
W2OCL	176– 8– 11–B– 2
W2OFV	38– 3– 5–A– 2
W2BWC	30– 3– 4–A– 1
'Phone	
W2EGG	10200–40–129–B–18
W2JEB	8806–37–119–B–20
W2LHQ	7260–33–111–B–35
W2JZX	6600–33–100–B–11
W2MIO	2852–23– 62–B–12
W2LGS	1025–10– 41–A–19
W2BRV	550–11– 25–B– 5
W2LJJ	398– 3– 53–A–21
W2HVR	18– 3– 3– – –
W2LZR*	12– 2– 3– – –

No. New Jersey:

W2JAE	108885–61–714–A–40
W2JUU	58000–58–400–A–40
W2LJY	57143–57–402–A–36
W2LTP*	54000–54–415–A–39
W2LMN	48062–59–326–A–29
W2MLV	48060–54–356–A–33
W2HXI	41565–51–326–A–28
W2WC/2	33721–53–256–A–27
W2GKE	28438–59–244–B–34
W2WZ	13858–41–171–B–18
W2JKH	13413–37–145–A–14
W2CW	11475–34–137–A–15
W2BZB	10125–30–135–A– 9
W2OEN*	9227–33–129–A– –
W2OAE	9150–30–125–A–33
W2HDD	8346–39–110–B–27
W2GFW	7452–36–104–B–12
W2MDP	7250–29–100–A–19
W2NZH	6728–26–104–A–28
W2HFN	5880–30– 98–B–30
W2NWA	5530–28– 82–A–17
W2LMO	5319–23– 93–A–11
W2JSE	4260–24– 71–A–10
W2ASY	3688–25– 59–A–32
W2JSF	3250–25– 52–A–11
W2NJE	1605–17– 38–A– 6
W6QGH/2	1449–21– 35–B– –
W2MLW*	1140–19– 60– – –
W2CFW	938–15– 25–A– 5
W2GLB	900–16– 23–A– 8
W2FDL	400–10– 16–A– 6
W2HCO	16– 4– 4– – –

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(*Continued from page 80*)

W2NCY [6]	16- 4- 4- - -	W2DMJ	17850-50-179-B-32
'Phone		W2GZT *	50- 4- 5-A- 2
W2JKH	20758-46-183-A-39	W2MRK	3- 1- 1-A- 1

MIDWEST DIVISION

Iowa:

W9LDH	53100-59-361-A-39
W9ATG	28350-50-286-B- -
W9QVA	27158-51-213-A-33
W9OZL	24860-44-227-A-30
W9TJR	19270-47-165-A-25
W9AEW	19240-57-160-B-27
W9NKC	8622-37-106- - -
W9DPB	6120-40- 77-B- 8
W9TLH	5945-29- 82-A-27
W9NYX	3450-24- 58-A- 9
W9SCA	2100-21- 40-A- 8
W9OZO	1962-22- 36-A- 7
W9ZQI	463-10- 19-A- 4
W9VFM	444-12- 20-B- 3
W9CCE	247- 9- 11-A- 4
W9DJV	105- 6- 7-A- -
W9BCC *	2- 1- 1- - -
'Phone	
W9DJV	23- 3- 3-A- 1

Kansas:

W9NKM	21995-53-172-A-30
W9LTJ	19505-47-166-A-34
W9TVU	18338-45-163-A-21
W9NQH	14284-39-149-A-22
W9JND	13358-39-137-A-25
W9BYV	7480-60- 94-B- 6
W9ISS	5823-34- 71-A-18
W9SIL	4420-26- 70-A-13
W9KCS	620- 8- 31-A- 5
W9NGQ	219- 7- 13-A- 7
'Phone	
W9LVZ	10406-43-124-B-26
W9IWS	7155-27-107-A-38
W9FRK	5600-32- 70-A-16
W9OUU	4860-24- 81-A-18
W9PAH	420-12- 18-B- 2

Missouri:

W9GBJ	49184-58-424-B-35
W9UYD	37015-55-338-B-31
W9QMD	35554-57-252-A-34
W9GHD	27195-49-222-A-36
W9VAV	24035-44-221-A-35
W9CWW/9	20930-52-161-A-19
W9CR	11970-38-126-A-17
W9YTC	11610-43-109-A-22
W9MCX	11588-41-115-A-39
W9BQZ	6623-37- 90-B-12
W9LTW	5233-26- 82-A-17
W9AEJ	4785-29- 67-A- 8
W9NCD	3024-24- 63- - -
W9RPH	1598-18- 37-A-18
W9KIK	439- 9- 20-A-10
W9SOM	375-10- 15-A-10
W9GCL	225- 9- 14-B- 8
'Phone	
W9OMG	22750-50-234-B-40
W9HVW	20210-47-172-A-38
W9GEP	120- 3- 16-A- 4

Nebraska:

W9ZAR	79650-61-532-A-40
W9ZRP	63000-60-420-A-26
W9AZT	36438-55-265-A-30
W9INR	9682-47-103-B- -
W9RQW	5688-14-166-A-32
W9RQS	5550-37- 75-B-18
W9NYU	4160-26- 66-A-10
W9OYB	2625-14- 75-A-21
W9MTI	2400-25- 48-B-14
W9MVO	2226-13- 72-A-19
W9FQB	1378-19- 34-A- 7
W9PUK	434- 7- 34-B- 4
'Phone	
W9KQX	26538-55-193-A-32
W9ARE	11960-52-115-B-13
W9MLB	10472-44-121-B-19
W9GDB	9768-44-114-B-18
W9CQX	6165-36- 68-A-14
W9GYM	2400-20- 61-B-13
W9YXR	2352-24- 49-B-18

NEW ENGLAND DIVISION

Connecticut:

W1KQY	76950-60-513-A-40
W1BIH	58575-55-427-A-40
W1CSY	48668-54-361-A-38
W1FMV	35000-56-250-A-25
W1LTB	31460-52-243-A-34
W1KIO	30026-51-236-A-31
W1LZM	27143-47-231-A-25
W1AGT	26455-37-286-A-24
W1TD	21091-47-180-A-21
W1APA	13570-46-118-A-14
W1MVE [8]	13163-39-135-A-20
W1NQK	11055-33-134-A-20
W1LTZ	8483-39- 87-A-19
W1KUK	7750-31-100-A-19
W1BHM	7673-31- 99-A-13
W1NIW	7425-27-111-A-21
W1NQP	5348-23- 93-A-19
W1EUG	4745-26- 73-A-16
W1JWQ	3859-17- 46-B- -
W1KDO	2745-18- 61-A-20
W1LJY	2025-18- 45-A- 6
W1NCS	1800-18- 40-A- 8
W1KDQ	518- 9- 23-A- 7
W1BW	425-10- 17-A- 3
W1JYW	385-11- 14-A- 3
W1GC *	330-11- 15-B- 2
W1ATH	5- 1- 2-A- 1
W1TS [9]	99583-61-653-A-40
W1UE [9]	7070-28-101-A- 9
W1NJM [9]	6400-32-100-B-10
W1INF [9]	792-11- 36-B- 5
W1BDI [9]	216- 9- 12-B- 2
'Phone	
W1KSK	414- 9- 23-B- 1
W1EUG	70- 4- 7-A- 2
W1HMZ	4- 1- 2-A- 1

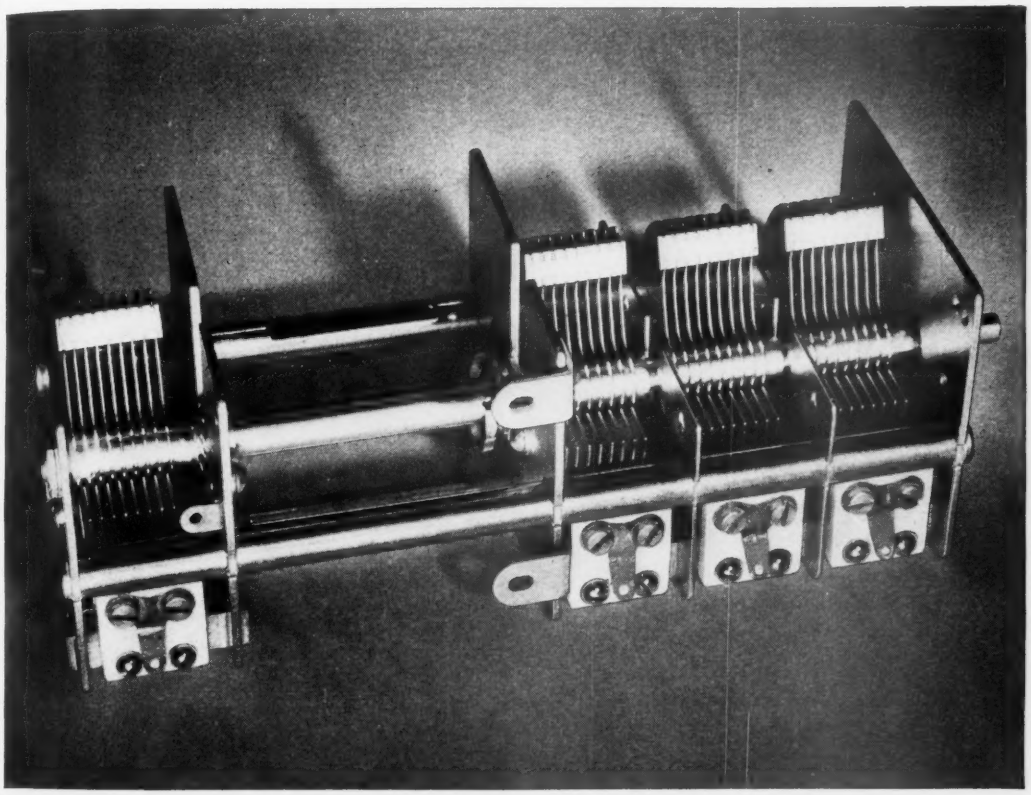
Maine:

W1OR [10]	61002-58-564-B-40
W1GKJ	45220-56-323-A-40
W1DEO	37675-55-274-A-29
W1LSK	27412-51-215-A-32
W1MUY	12878-34-157-A-31
W1NGV	6250-25-100-A- -
W1IJX	5800-24- 97-A-18
W1BUZ	1948-19- 41-A-11
W1FDL	572-13- 22-B-11
W8RNT/1*	1- 1- 1- - -
'Phone	
W1LOA	10968-41-108-A-34
W1KKZ/1	1230-15- 41-B- 8
W1ACW	1083-19- 29-B- 6

E. Massachusetts:

W1RY	63125-61-415-A-35
W1JOY	47385-54-351-A-40
W1HZ	21068-53-159-A-19
W1AQT	16632-52-154-B-20
W1MDV	15880-40-198-B-28
W1NKW	10368-29-143-A-31
W1MKX	9363-35-109-A-22
W1MAN	9198-26-142-A-20
W1MLG	8156-29-114-A-24
W1NAH	7125-30- 95-A-17
W1MQX	5531-25- 90-A-28
W1MNU	5250-20-105-A- -
W1LOS [11]	4818-33- 75-B- 5
W1MQR	3510-27- 65-B- -
W1NDP	3050-18- 70-A-24
W1NAV	2723-22- 50-A- -
W1NFZ	2558-22- 47-A-23
W1WV	2500-25- 50-B- 8
W1WI *	1080-18- 30- - -
W1NIT*	788-14- 22-A- 8
W1LNN	750-10- 30-A- 4
W1CQN	578-11- 21-A- 8
W1ALP	280- 8- 14-A- 5
W1EMG	203- 9- 9-A- 1
W1JEA	192- 8- 12-B- -
W1NHB [12]	175- 7- 10-A- 3

ISOLANTITE INSULATION SELECTED FOR NEW CONDENSER DESIGN



ISOLANTITE* INSULATION is the choice of a leading manufacturer for the new condenser design illustrated. The manufacturer has found that Isolantite offers definite advantages that contribute to ease of manufacture and to efficiency in operation.

A combination of outstanding properties makes Isolantite ideally suited for high frequency applications involving the assembly of metal parts. Isolantite's dimensional precision plus mechanical strength reduces the risk of breakage either in assembly or service. These properties combined with a high degree of vitrification plus low-loss make Isolantite the preferred insulation for condenser applications.

These are also a few of the reasons why leading manufacturers of sets and component parts have made liberal use of Isolantite in the design of their equipment. Naturally, the same factors today are contributing to an increasing demand for Isolantite in a wide range of applications essential to the nation's Victory program.

In order to meet this increased demand, Isolantite is pushing to completion a comprehensive expansion program that will permit greatly increased output and more efficient service to the many users of Isolantite's products.

ISOLANTITE

CERAMIC INSULATORS

ISOLANTITE INC., 233 BROADWAY, NEW YORK, N.Y.

*Registered trade-name for the products of Isolantite Inc.

(Continued from page 82)

W1NFB	8- 2- 2- - 1	W1BFT	21480-48-179-A- -
W1NOD	4- 1- 1-A- 1	W1KLV	18125-50-145-A-22
W1MCR*	2- 1- 1- - -	W1NEI	14183-31-184-A-21
		W1IP	7840-28-112-A-12
'Phone		W1GEY	3520-22- 64-A- 6
W1HKK	43560-60-366-B-37	W1EAL	3300-24- 55-A-11
W1KQN	18816-49-192-B-32	W1MUW[19]	3000-20- 60-A- 7
W1IIM	18008-48-200-B- -		
W1SS	10209-41-125- -39	*'Phone*	
W1ZR	4966-29- 69-A-19	W1HRI	17160-48-143-A-36
W1KVH	4368-24- 91-B-22	W1HSC*	360- 9- 16-A- -
W1KTE	4025-24- 70-A-18		
W1AIZ	900-12- 30-A-12	***Rhode Island:***	
W1LEA	440-10- 22-B- 8	W1BBN	20250-50-203-B-32
		W1AOP	2610-20- 44-A-11
W. Massachusetts:		W1MCP	2200-25- 45-B-15
W1AUN	35282-59-303-B-34	W1AEI	1980-22- 36-A- 9
W1MKR	24300-48-206-A-26	W1INB	1144-15- 32-A-27
W1FAA	7475-26-115-A-24	W1JTB	4- 2- 2- - -
W1NKN	6649-27-100-A-16		
W1BEF	5640-24- 94-A-23	*'Phone*	
W1BIV	3264-24- 68-B- 7	W1FOV	7844-37- 58-B-27
W1MND	1710-19- 36-A- -	W1LBV	426-11- 16-A- 2
W1ASU	372-12- 16-B- -	W1JTB	9- 3- 3- - -
W1BDV	325-10- 13-A- 2		
		Vermont:	
'Phone		W1EJK	22140-36-247-A-29
W1GUF	11055-33-168-B-35	W1NDB	22099-51-226-B-38
W1LDE	48- 4- 6-B- 5	W1BJP	10960-32-137-A-16
		W1KTB	1900-25- 38- - -
New Hampshire:		W1JDP	1435-14- 41-A- -
W1AVJ	38920-56-278-A-37	W1QQ	140- 7- 8-A- 2
W1HSC*	27080-42-258-A- -		
		'Phone	
		W1AVP	561-17- 33- - -

NORTHWESTERN DIVISION

Alaska:		W7AIG	30- 3- 4-A- 1
		W7HAL*	3- 1- 1-A- -
K7CZY	4959-29- 86-B-20		
K7KG	1505-14- 43-A- -	*'Phone*	
K7DIS	1050-15- 28-A- 7	W7QP	13362-51-142-B-33
K7FQG	15- 2- 3-A- 4	W7GNJ	7252-37- 98-B-14
K7JAY	3- 1- 1-A- -	W7HHH	2160-24- 45- - 7
		W7IIK	440-11- 20-B-10
Idaho:		W7MQ	280-10- 14- - -
W7ZN	45994-58-399-B-40	W7HVX	10- 2- 4-A- -
W7IGV*	9310-38-125-B-23		
		Washington:	
'Phone		W7VY	65760-60-548-B-37
W7HZD	6160-22-142-B-34	W7RT	41385-56-299-A- -
		W7IBW	14006-45-125-A-16
Montana:		W7HUK	6818-27-102-A-32
W7GDU	44297-58-310-A-39	W7IUS	5670-21-100-A-33
W7IVY	1425-19- 31-A-14	W7FLD	4640-32- 75-B-22
W7III	1235-13- 38-A-10	W7IFV	2760-24- 46-A-10
W7HEM	162- 9- 9-B- 2	W7GVA	2158-26- 43-B- 4
W7CME*	10- 2- 2-A- 2	W7HRY	1066-13- 42-B- 8
		W7IKQ	770- 7- 56-B-35
'Phone		W7DP	720-12- 24-A-11
W7HZR	2587-15- 69-A-19	W7IIT	350- 7- 20-A-17
W7IEH	90- 3- 12-A- 3	W7GSW	123- 7- 7-A- 4
		W7DMN*	12- 2- 3-B- 2
Oregon:		W7BTZ*	2- 1- 1-B- 1
W7ENW	52998-58-371-A-39		
W7BOH	6683-33- 81-A-24	*'Phone*	
W7GUP	3968-31- 64- - -	W7FLD	3304-28- 62-B-22
W7GLF	3022-26- 47-A- -	W7DZX	2100-21- 50-B-14
W7ACQ	2900-25- 59- - -	W7AXS	1628-22- 37-B- -
W7BS	66- 6- 12- - -	W7IFV	825-15- 22-A- 7
W7MQ	60- 5- 6- - -	W7WF	509-11- 19-A- 6
		W7GSW	5- 1- 2-A- 4

PACIFIC DIVISION

Philippines:		*'Phone*	
		W6DZE	11960-46-133-B-21
'Phone			
KA7FS	2- 1- 1- - -	***East Bay:***	
KA1JH	2- 1- 1- - -	W6MVQ	52860-60-453-B-37
		W6NGC	21250-50-170-A-18
San Joaquin Valley:		W6LMZ	13064-46-142-B-18
W6BVM	51832-62-419-B-40	W6HPB	368- 7- 21-A- 7
W6SRU	33350-58-231-A-35	W6RKB	260- 8- 13-A- 5
W6SCS	13035-44-125-A-24	W6SLC	203- 9- 9-A- 4
W6QXF*	8888-44-101- - -		
W6KZG/6	3480-24- 59-A-29	*'Phone*	
W6CLZ	306- 9- 17-B- 2	W6ITH	2- 1- 1-B- 1
W6IWU	1400-20- 37-B-11		
		San Francisco:	
Santa Clara Valley:		W6GWW	36112-61-296-B-39
W6YX[13]	63135-61-414-A-37	W6MUF	24828-60-166-A-20
W6NHW	36653-54-275-A-40		
W6QYI	25194-57-221-B-28	*'Phone*	
W6MYT	1093-19- 23-A- 5	W6SG	136- 8- 9-B- 2
		W6MUF*	4- 1- 2- - -

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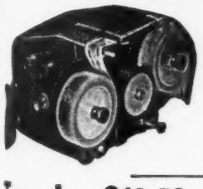

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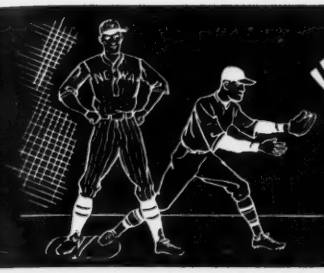

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W5JWA	12688-29-	125-A-27

[1] W3GRF opr. [2] Visitors took part in operating. [3] W8WTI opr. [4] W9UUM opr. [5] New call received from FCC. W9BHB used during second week-end period. [6] Two oprs., W4FWF, W4FDT. [7] Five oprs., W2MLW, W2LIQ, W2GUH, W2JBI, W2LTP. [8] Two oprs., W1TD, W1MVE. [9] HQs staff members not eligible for awards. [10] W1LHK opr. [11] W8TWP opr. [12] W1JEA opr. [13] W6PAR opr. [14] Greensboro Radio Club, five oprs. W4BHA, W4GXB, W4AJT, W4AGD, W4EIW. [15] Not eligible for section award. Three oprs., W4DWB, W4ERG, W4FXU. [16] W5IA opr. [17] Five oprs., W5HEF, W5FOG, W5FOM, W7COV, W7EYS. [18] Twelve oprs., W9LGN, W5KHJ, W8VKC, W5HFN, W5JIQ, W5KKB, W7HYS, W5IKP, W9AHW, W5IFD, W9BJD, W9PJJ. [19] Two oprs., W1MUW, W1JMY.

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